

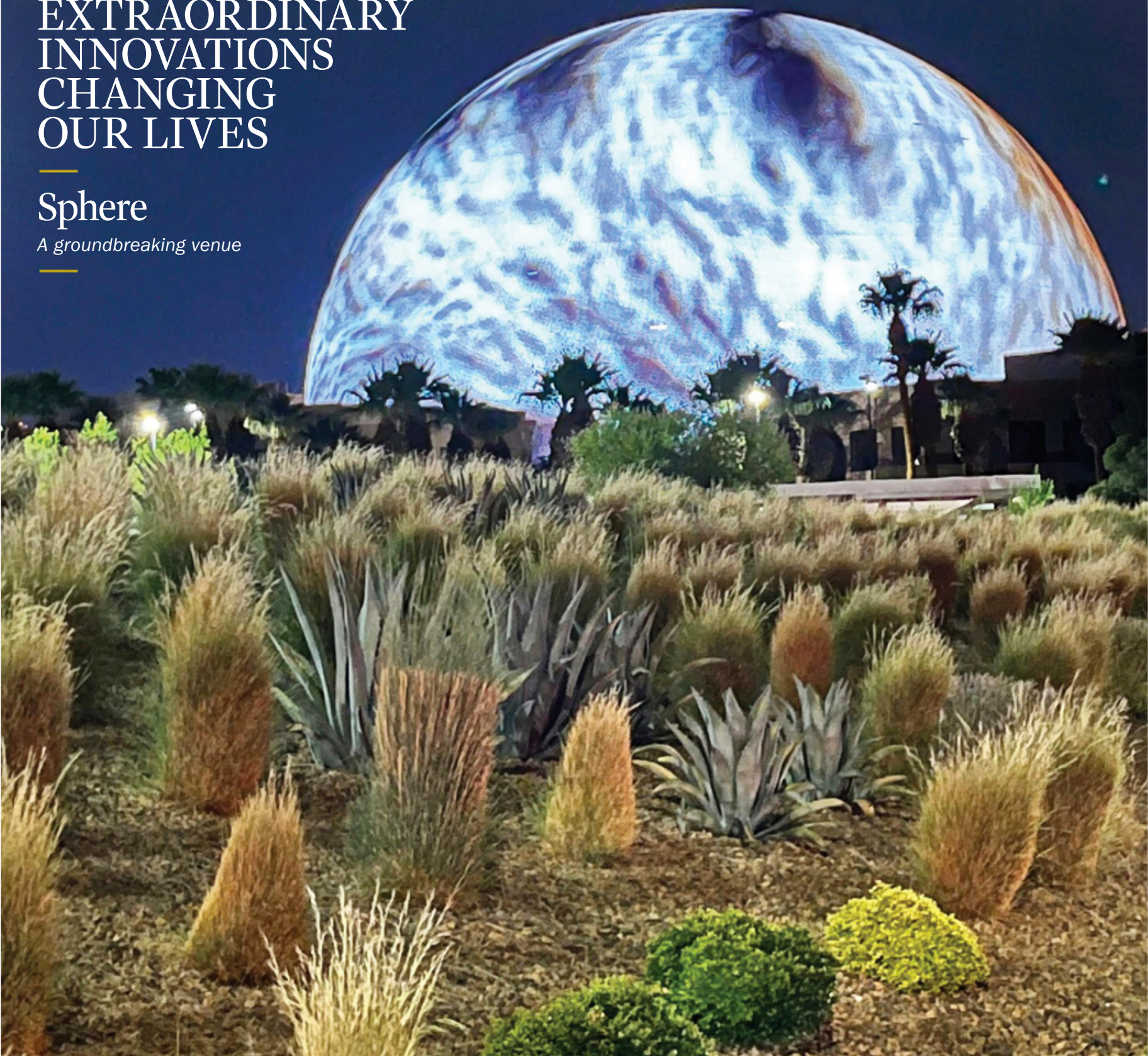
Best Inventions *of 2023*

TIME

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It takes time to become an icon

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CONTENTS

9 The Brief

27 The View

71 Time Off

36 The Missing

Israeli families waiting to hear about loved ones missing since the Oct. 7 Massacre—in portraits and in their own words

44 What the World Can Do

With Israelis and Palestinians blinded by anger and grief, someone must guard what space remains for peace

By Yuval Noah Harari

45 Under Bombardment

Gaza photojournalist Saher Alghorra documents the destruction of the only home he has known

By Sangsuk Sylvia Kang

^
After an Israeli airstrike in Gaza City on Oct. 7

Photograph by Saher Alghorra—Middle East Images/AFP/Getty Images

49 Best Inventions 2023

A bird-watching bird feeder, a shushing bassinet, Braille Legos, and 197 other brilliant innovations that can improve life—and sometimes the world



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After the Oct. 7 Massacre



We hope sharing these stories can help hold a space for peace

THE SCENE AS RECOUNTED BY EYAL NOURI IS almost too painful to tell: his uncle, Said Moshe, was killed in front of his aunt Adina. His last sighting of Adina is from a photograph posted online: “You see her on a motorcycle,” Eyal says. “She’s sitting in the middle between the two terrorists. Think about the situation. A few minutes ago she saw her husband, the one that she loved for the last 50 years, murdered in front of her eyes, and now they’re taking her to an unknown place in the Gaza Strip.”

Adina Moshe, 72, is believed to be one of nearly 200 hostages taken by Hamas following the Oct. 7 Massacre, which killed at least 1,400 people in Israel. It was, as TIME’s Karl Vick wrote in the hours after the attack, Israel’s Sept. 11, the worst act of violence committed against Jews since the Holocaust.

Events were moving fast in the Middle East as we closed this week’s cover story. President Biden arrived. Hundreds of people were feared dead following an explosion at a Gaza City hospital. Diplomats were working to create a humanitarian safe zone in Gaza while Israeli airstrikes continued. Thousands of people have been killed in the Gaza Strip since Oct. 7, Palestinian health authorities said, and hundreds of thousands of Palestinians are trying to evacuate, though many have nowhere safe to go.

As these events throttled forward, we felt it was important to pause, and to listen to the family members of those who were taken on Oct. 7. In recent days, TIME reporters, editors, photographers, video journalists, and contributors have worked around the clock to gather the voices of the families Hamas has placed in a terrible limbo. Their stories are assembled here, along with this week’s cover, which features Rachel Goldberg and Jonathan Polin, whose son Hersh Goldberg-Polin, age 23, is, like Adina Moshe, believed to be among the hostages.

Keren Schem’s daughter Mia, 21, was taken from the Nova music festival. Schem has not heard from her daughter since the attack. On Oct. 16, Hamas released a video of Mia. “I want to tell Mia, if she hears me: I will do everything I can,” Keren Schem told TIME. “And if they hear me, our cruel enemy, I’m telling them now: You can come here and you can take me. Bring my daughter home. She is only an innocent child. Take me and bring my daughter home.”

The pain of uncertainty echoes across these interviews.



Eyal Nouri in Caesarea, Israel, on Oct. 16.
Read more at time.com/israel-hostages

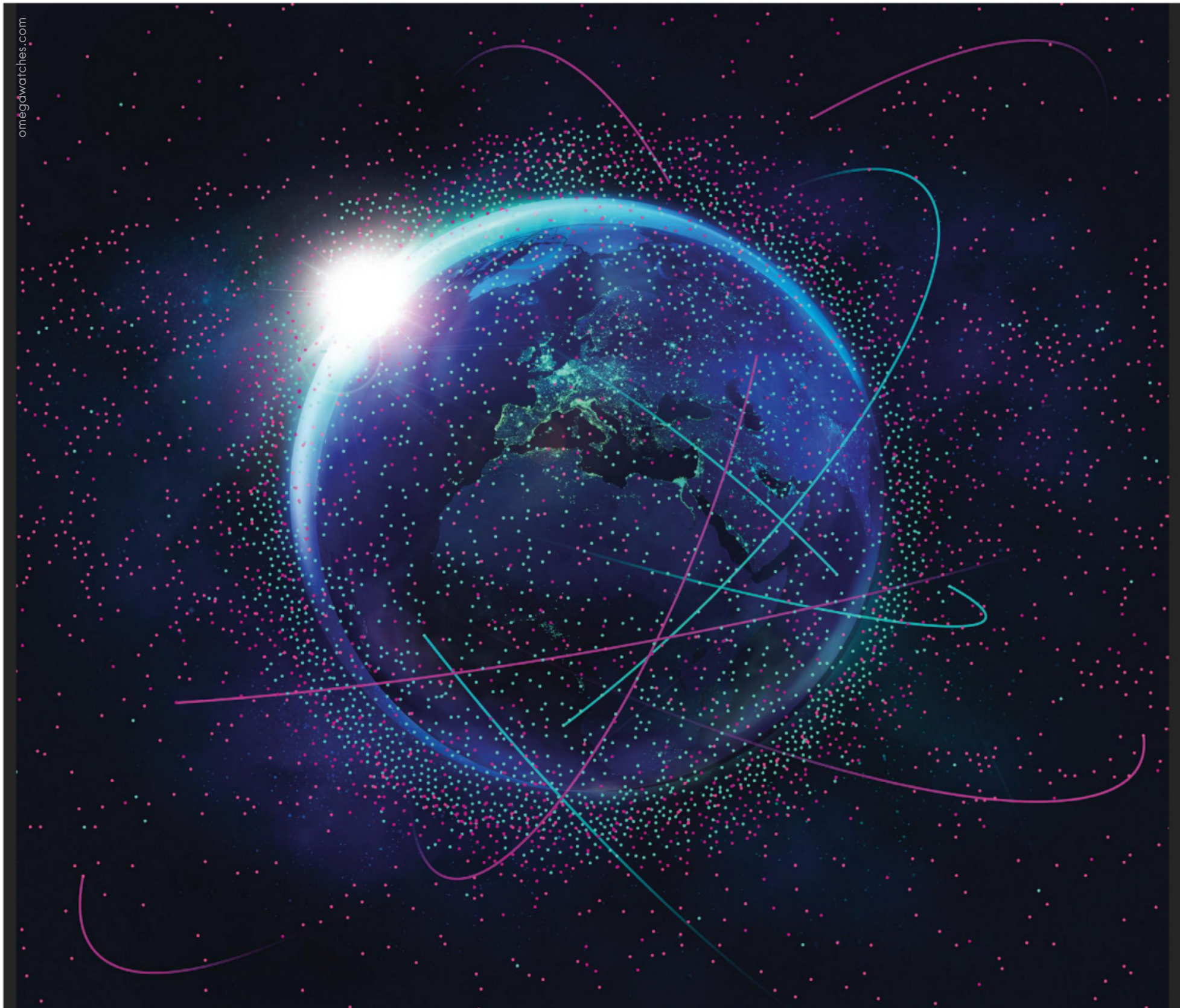
“Not knowing is the worst thing,” says Ahal Besorai, whose sister and her family are missing after the attack on Kibbutz Be’eri. “There’s no sense of finality; as human beings, this is what we crave. There is some sense of relief in completeness, even if it’s bad.”

AT TIME, OUR MISSION is to tell the stories that shape the world. The journalists covering this have been conducting some of the most painful interviews of their careers. This is their duty, as it is for our colleagues throughout the industry who are risking their lives every day to tell these stories. For decades, TIME has covered the tragedy and complexity of the Israeli-Palestinian conflict. We will continue telling all of these stories. That is our duty too.

The Israeli philosopher Yuval Noah Harari wrote for TIME a piece that is at once a history of this moment and a plea to the world. “It is the job of outsiders to help maintain a space for peace,” Harari writes. “We deposit this peaceful space with you, because we cannot hold it right now. Take good care of it for us, so that one day, when the pain begins to heal, both Israelis and Palestinians might inhabit that space.”

These families of the hostages are shattered. Their world is shattered. We hope sharing their stories can help hold that space for peace and begin the necessary work of repairing the world.

Sam Jacobs,
EDITOR-IN-CHIEF



A MAP TO THE FUTURE



The future of space exploration is full of possibility. As innovation takes off, OMEGA is aiming for a sustainable tomorrow, where the path is clear in every direction. Continuing our proud legacy beyond Earth, we're now partnering with Privateer to keep track of the debris that currently surrounds our planet. By doing this, we can look confidently ahead, and ensure that nothing stops humanity from reaching the next frontier. Scan the code to learn more about the project.



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Celebrating top women working on artificial intelligence

More than 60 guests gathered on Oct. 12 in San Francisco for a TIME100 Impact Dinner, presented by Meta, honoring the extraordinary women leading the future of artificial intelligence—some of whom were on TIME's inaugural list of the 100 most influential people in AI. Above, from left, Black Girls Code founder Kimberly Bryant, Meta VP Campbell Brown, OpenAI VP Anna Makanju, Moonhub CEO Nancy Xu, TIME CEO Jess Sibley, attorney Sarah Conley Odenkirk, professor Fei-Fei Li, and Encode Justice founder Sneha Revanur.



TIME100 Talks

For Advertising Week in New York City, TIME hosted a TIME100 Talks breakfast on Oct. 18 with Meta to explore how marketing executives can use AI. TIME editor-in-chief Sam Jacobs interviewed Janet Balis, Partner, Marketing Practice Leader, EY, and Cheryl Guerin, executive vice president of global brand strategy and innovation at Mastercard, while TIME's chief marketing officer Sadé Muhammad, above left, led a conversation with Matt Steiner, VP Monetization Infrastructure & AI, Meta.

TIME for Kids

TIME for Kids has launched Service Stars, a new program to spotlight and support kids making positive change, made possible by the Allstate Foundation. Find free resources at ti.me/stars



Tune in

TIME health correspondent Jamie Ducharme's 2019 cover story and 2021 book on the rise of Juul are now the basis of a docuseries, *Big Vape*, streaming on Netflix. As Ducharme writes on TIME.com, Juul aimed to "create an e-cigarette good enough to make cigarettes obsolete—and instead became infamous for hooking countless teenagers on nicotine."

On the covers



Jonathan Polin, left, and Rachel Goldberg in Jerusalem on Oct. 15. Their son Hersh Goldberg-Polin, 23, is missing

Photograph by Michal Chelbin for TIME



Photograph by Raoul Gatchalian

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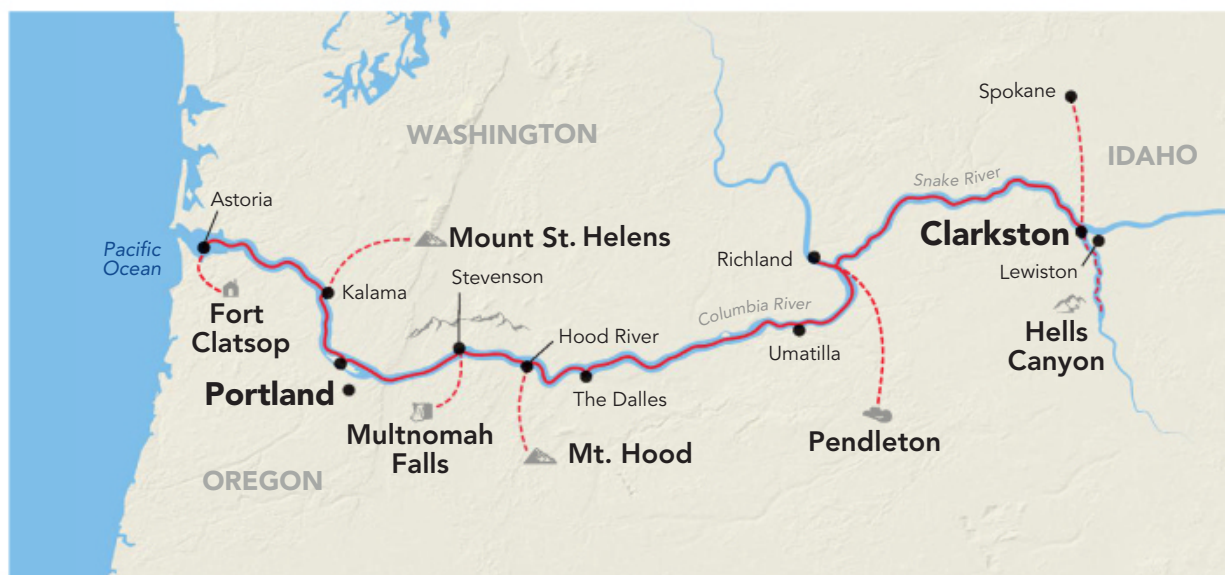
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PURINA TRADEMARKS ARE OWNED BY SOCIÉTÉ DES PRODUITS NESTLÉ S.A.

The Brief



A NEWER WORLD ORDER

BY WILL HENSHALL

Tighter export controls on
computer chips escalate the U.S.
rivalry with China

INSIDE

BEDBUGS INVADE
CITIES OF THE WORLD

THE NEW APPEAL OF
THE U.S. MIDWEST

THE ENDURING CHARM
OF JOHN GRISHAM

NOT BY CHANCE DID THE ERA OF WORLDWIDE free trade—globalization—coincide with the hope of successive U.S. governments that the capitalism that was lifting billions of people out of poverty would also show China the merits of democracy. The two were invariably linked, after all, in the Cold War that the West had won.

But China preferred to launch a new rivalry, promoting a new authoritarian system that offers the wealth of capitalism while exploiting elements (surveillance, centralization) of what generates so much of that wealth: digital tech.

That's why the Biden Administration announced on Oct. 17 that it is tightening export controls on semiconductor chips used for artificial intelligence and the equipment used to manufacture them. AI is considered key to efficiencies that could provide not only huge advantages in business and commerce, but also even more critical advantages in a country's military and defense. To ensure that more semiconductors are made in America, the Administration last year hailed passage of the CHIPS and Science Act.

And to prevent China from acquiring or producing advanced chips, the new Commerce Department rules aim both to close loopholes in controls announced a year ago, and to account for technological developments since.

But the controls are also a sharp escalation in the contest for technological superiority between the U.S. and China, even as the Biden Administration tries to cool tensions between the countries in other domains. The chips themselves are increasingly crucial for the development of state-of-the-art AI systems. And though some analysts question the controls' efficacy, if they succeed, China could be left behind.

“PROTECTING OUR FOUNDATIONAL TECHNOLOGIES with a small yard and high fence” is how White House National Security Adviser Jake Sullivan has previously described the restrictions, implying that the rules are tailored to affect only advanced technology with relevance to national security.

But others say the restrictions go further, edging into the realms of business and trade. A report by Gregory Allen, director of the Wadhvani Center for AI and Advanced Technologies at the Center for Strategic and International Studies think tank, argued that because the restrictions are industry-agnostic and aim to prevent China from ever matching U.S. capabilities, they “marked

the beginning of a new era in U.S.-China relations.”

That unsettles some U.S. tech companies. China is a huge market for chip manufacturers—accounting for 20% to 25% of American company Nvidia's data-center revenue. The stocks of chipmakers, including Nvidia, plummeted after the announcement, and the Semiconductor Industry Association (SIA) warned that “overly broad, unilateral controls risk harming the U.S. semiconductor ecosystem without advancing national security as they encourage overseas customers to look elsewhere.”

The industry's apprehension is one measure of the Administration's seriousness. Analysts and policymakers have argued that the 2022 restrictions allowed the sale of chip-manufacturing equipment to companies like Semiconductor Manufacturing International Corporation, a Chinese state-owned chip manufacturer, and

were not properly enforced.

There have also been accusations of Chinese AI developers' smuggling chips into the country. Chinese chip developers, experts argue, have been able to continue catching up with the technological frontier, and Chinese AI developers have been continuing their work apace.

Last year's restriction contained “major loopholes,” says Dylan Patel, chief analyst at SemiAnalysis, a semiconductor-industry analysis firm. “[Semiconductor manufacturers'] business was not really impacted at all.” The updates have tightened restrictions on the sales of chips, but Patel says they still have left possible openings for the sale of chip-manufacturing equipment. With further restrictions on the types of chips it can import but lenience around

chip-manufacturing equipment, Patel predicts that the latest rules will encourage development of China's domestic chip industry.

Commerce Secretary Gina Raimondo said export controls were likely to be updated at least annually, as the technology continues to advance.

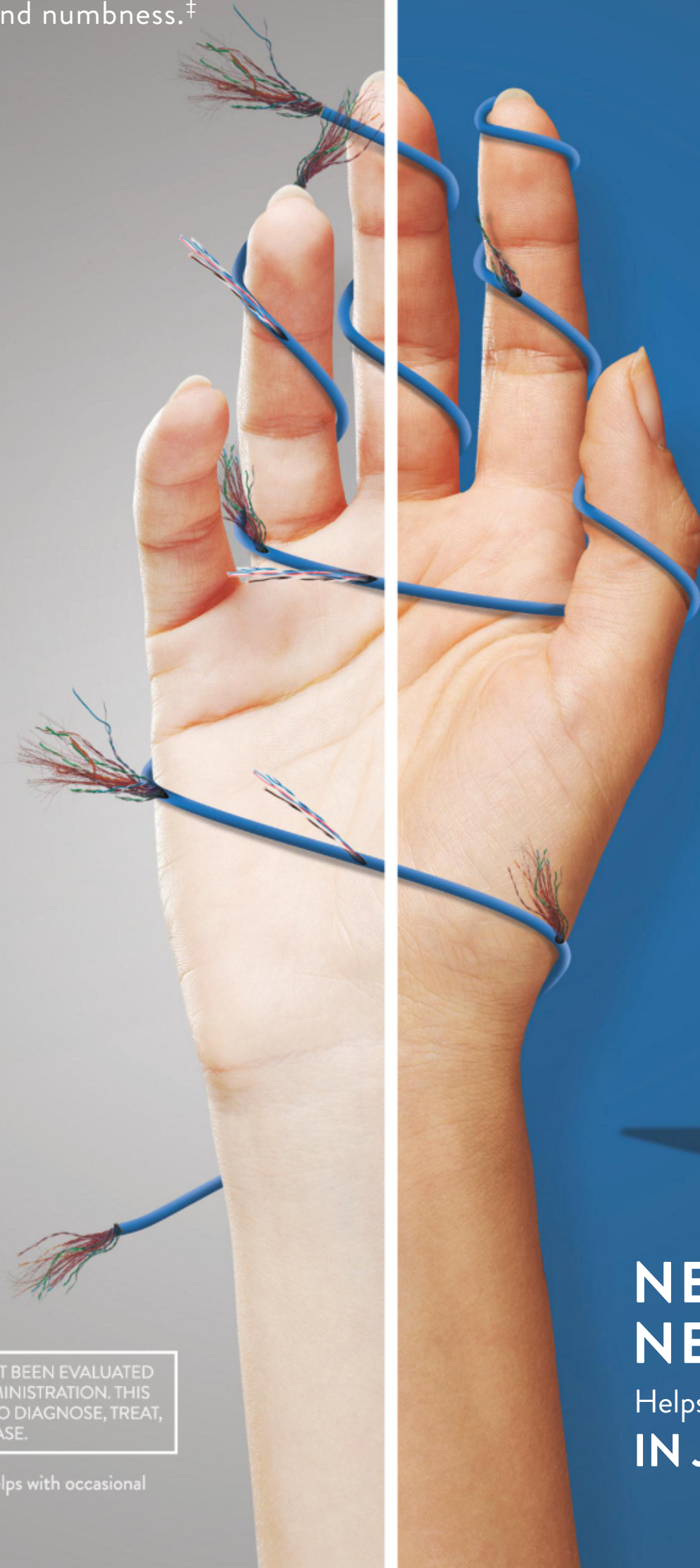
“On one level, this can seem really technocratic and boring—the chip-performance thresholds and interconnect bandwidth—but at the end of the day, these most advanced chips are a huge area of geopolitical competition,” says Paul Scharre, executive vice president and director of studies at the Center for a New American Security, a military-affairs think tank. “I think we're going to continue to see Chinese actors and other global companies, including U.S. companies, be responsive and change their behavior, but also find ways to continue to make money and advance their own interests despite this.” □

‘These most advanced chips are a huge area of geopolitical competition.’

—PAUL SCHARRE,
EXECUTIVE VICE PRESIDENT,
CENTER FOR A NEW AMERICAN SECURITY

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A string of quakes

A band of volunteers begin to clear the rubble of a wall that toppled in the Zenda Jan district of Afghanistan's Herat province during an earthquake on Oct. 11. That seismic event was one of five quakes to hit western Afghanistan within eight days after Oct. 7, when a magnitude-6.3 earthquake destroyed villages and left more than 2,000 people dead.

THE BULLETIN

Bedbugs aren't just a problem for Paris

THE NEWS REPORTS ARE ALARMING to say the least: Paris, the city known for its style, cuisine, and romance, has a bedbug problem. But what's behind the invasion? How did the insects manage to infiltrate so much of the city? With Paris hosting the first Olympics in the post-COVID-19 era next summer, those questions aren't just matters for idle conversation.

BEDBUG BASICS Bedbugs feed almost exclusively on human blood, and find their meals by homing in on the carbon dioxide we exhale. Because they are cautious creatures, they feed when we're asleep or relatively immobile while sitting on a couch or chair, before scurrying back into tiny cracks and crevices in mattresses or between

walls and floors. They are remarkably hardy genetically, and can inbreed with little problem for generations.

BRED TO BE BAD Today's bedbugs are resistant to nearly every insecticide available. While DDT and organophosphates effectively controlled bedbug populations for decades, after those chemicals were banned for harming human health, the insects developed resistance to remaining pesticides so that "we now have thick-skinned, hard-drinking, mutant bedbugs," says Dini Miller, a professor of entomology at Virginia Tech. Their thicker exoskeletons keep insecticides out, and they also have enzymes that can break down chemicals even if they do end up absorbing some.

BATTLE PLAN Bedbugs persist in any city, including Paris, because getting rid of them is expensive and involved. The best method involves a multi-pronged strategy including some combination of pesticides, a fungus-based treatment that kills infected bugs, heating an entire dwelling to 125°F or above, or using silica dust to suffocate them. Vacuuming visible bugs is also an important first step. Ultimately, however, leaving it up to individuals to manage them may only keep the bug populations thriving. "Unless they are dealt with on a broader, society-wide scale, the problem will not go away," says Zachary DeVries, an assistant professor of entomology at the University of Kentucky. —ALICE PARK



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GOOD QUESTION

Why is the internet obsessed with fall?

BY MARIAH ESPADA AND MOISES MENDEZ II

AUTUMN DIDN'T OFFICIALLY BEGIN UNTIL SEPT. 23, but for TikToker Chasitey Pounds, it started in June. Pounds, 26, is one of many content creators who cultivate followings with comforting autumn visuals like pumpkin-spice lattes, candles, and chunky sweaters. The online niche has amassed major traction, with hashtags like #autumnaesthetic and #fallaesthetic collectively gaining over 7 billion views on TikTok. "I want to create stuff that emulates the feeling of coziness and brings people some comfort in everyday life," she says.

Fall has been Pounds' favorite season since she was a child. Now, sharing seasonal videos has enabled her to leave her day job. The internet and its fall enthusiasts have played a big role in the commodification of the season: NielsenIQ data shows all things pumpkin-spice-market produced more than \$800 million from July 2022 to July 2023.

If Christmas stores can do business year-round, the North Carolina-based creator sees no reason to limit autumn to the three-month bracket of a calendar. She's realized that the internet is interested in cozy content in any season. "I'm really good at emulating that autumn feeling even if it's like 90° outside," she says.

THE INTERNET'S LOVE of foliage content started long before the emergence of TikTok, in the early days of Pinterest and Tumblr, and on platforms like Instagram, where influencers used "fall presets" and filter apps like VSCO, whose colors imbued their images with the feeling of fall year-round. Lifestyle YouTuber Bethany Mota became the face of the video platform thanks to her seasonal content, in particular a 2013 video with 17 million views in which she shares a fall morning routine: making tea, applying plum-hued makeup, heading to Starbucks for a Pumpkin Spice Frappuccino.

The appeal boils down to the sense of inherent comfort

< It may be sweltering outside, but online it's always sweater weather

One TikTok user recently referred to it as the "fall vibes big bang theory."

Today, no one exemplifies the internet's love for the season more than Caitlin Covington, a blogger who became the subject of the "Christian Girl Autumn" meme after her annual Vermont photo shoot went viral in 2019. Covington, 33, has embraced the meme, even if it's sometimes couched in a derisive tone, satirizing a certain type of perfectly coiffed white woman in a wide-brimmed hat and riding boots. It has no doubt brought attention, which in turn helps monetize her content, including recipes and outfit photos with affiliate links. Covington says that around 2013 or 2014, she noticed her autumn content was a star performer. "There was a very clear distinction in engagement when I was standing next to a beautiful fall tree, or there were fall leaves on the ground," she says. But the craze for fall content hasn't been universally welcomed. The Vermont town of Pomfret has been so overwhelmed with visitors seeking to capture brilliant fall content that it has barred tourists from one of its most photogenic roads during peak foliage.

For Pounds and Covington, the appeal of fall boils down to the sense of inherent comfort that radiates through the phone screen. "I deal with a lot of anxiety, and life is stressful and so busy," says Covington. "Fall is all about embracing moments of comfort, whether a hot coffee, a really soft cardigan, or a new book. Everybody can relate to that." And there may be something more subconscious at play: according to Karen Haller, a color-psychology specialist and author of *The Little Book of Colour*, "Colors that are very low in saturation are typically seen as very soothing," she explains.

"The world does this crazy thing where all the leaves turn from green to these beautiful vibrant colors," says Covington. "I think everyone can appreciate the beauty in that." Even on a sweltering day in June. □



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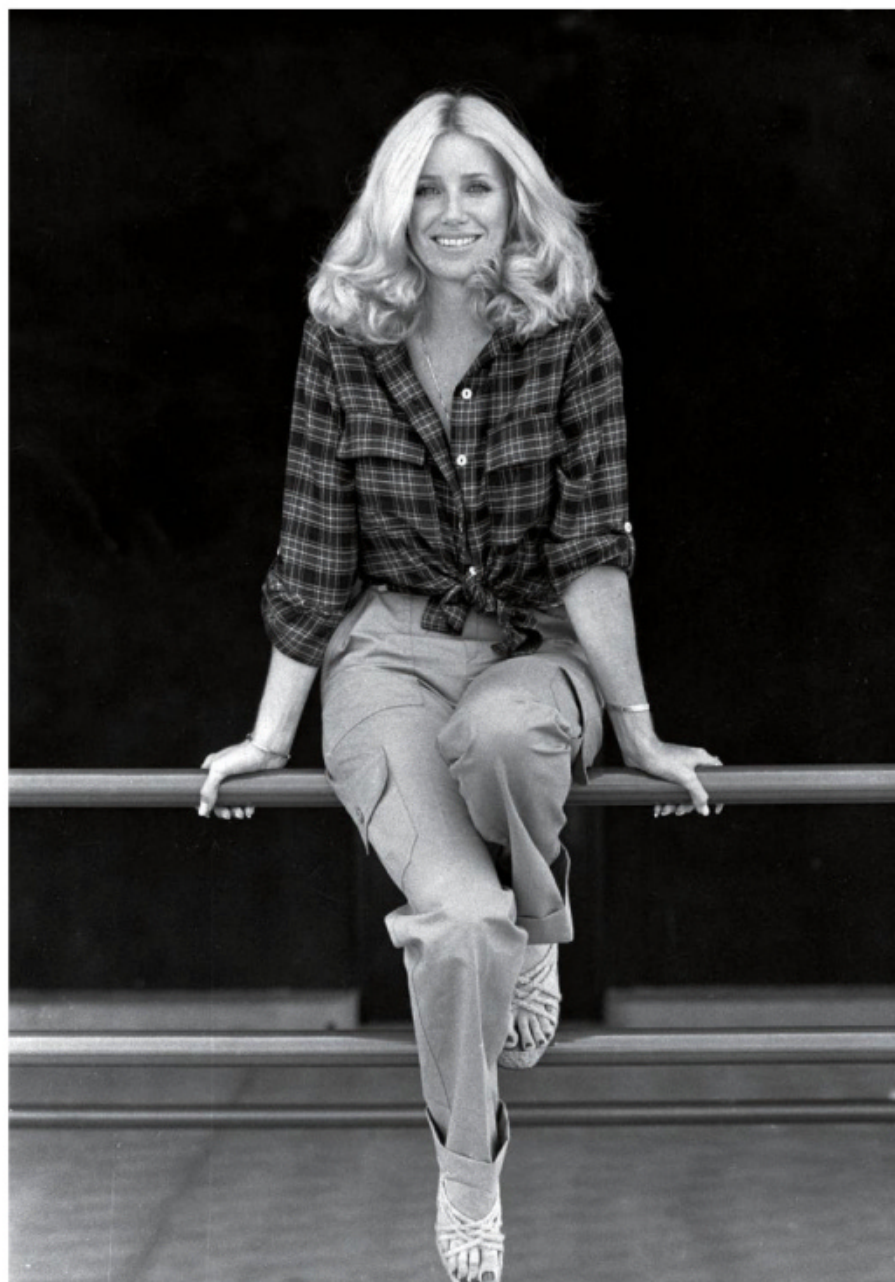
Entrepreneurial actor

SUZANNE SOMERS WAS never a dumb blonde. Her breakout character—Chrissy Snow on the ABC sitcom *Three’s Company*—may have been, but Somers herself was an actor, businesswoman, author, and health and wellness spokesperson. She died on Oct. 15 at age 76 after a battle with breast cancer.

“I’ve been playing what I think is one of the best dumb blondes that’s ever been done, but I never got any credit,” she told the *New York Times* in 1980. “I did it so well that everyone thought I really was a dumb blonde.”

Three’s Company ran from 1977 to 1984, and quickly became one of the country’s most popular shows. At the start of the show’s fifth season, Somers asked for a pay raise from \$30,000 to \$150,000 per episode to match the salary of her male co-star. ABC would offer only a \$5,000-per-episode raise, which Somers declined. The network fired her, and Somers sued for \$2 million. She received only a small fraction of what she asked for.

Somers made one movie, *Nothing Personal*



(1980), and after *Company* had a string of guest roles and made-for-TV movies before starring in another ABC sitcom, *Step by Step*, from 1991 to 1998.

She would go on to become a health and diet magnate. Many of her more than 25 books touched on wellness culture, though her support for bioidentical hormone replacement

therapy and alternative cancer treatments have been criticized by the medical community.

Perhaps most memorably, in the early 1990s, she was the spokeswoman in infomercials for the ThighMaster, an exercise product—one more way her enterprising spirit shone through.

—LAURA ZORNOSA

OBSERVED

Solar eclipse

“Ring of fire”

From the Pacific Northwest through the Southwest, people in the U.S. viewed a rare celestial spectacle on Oct. 14, when the moon passed between the sun and Earth, obscuring the sun’s light and bringing forth 2023’s solar eclipse.

The eclipse was an annular solar eclipse, which occurs when the moon is farthest away from Earth. That distance means it isn’t a total eclipse because the moon does not block out all of the sun’s light. Instead a “ring of fire” is created in the sky when the eclipse reaches its peak. The solar eclipse passed diagonally from states as far west as Oregon before moving south through Texas. It was the last annular “ring of fire” solar eclipse that will be visible in the U.S. until 2039, though Alaskans will be the only ones to view that event. —Solcyré Burga



DIED

Hall of Fame linebacker Dick Butkus, who played for the Chicago Bears in the 1960s and 1970s, one of the fiercest defensive players in an NFL era that predated concussion protocols, on Oct. 5 at 80.



RATIFIED

A new contract between production executives and the Writers Guild of America, which members voted to approve on Oct. 9, ending the five-month screenwriters’ strike. The contract deals with staffing, pay, and AI.

SOUGHT

Bankruptcy protection, by pharmacy chain Rite Aid, on Oct. 16. The company cited losses and over a thousand lawsuits from around the country related to opioids, which allege Rite Aid filled illegal prescriptions for painkillers.

DETHRONED

The Carolina Reaper, as the world’s hottest pepper, by the new “Pepper X”—a small, yellow-green variety that *Guinness World Records* announced measured 2.69 million Scoville Heat Units on Oct. 9.

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CLIMATE

Go Midwest, young man

BY ALANA SEMUELS

JAKE VIA, WHO HAS LIVED EVERYWHERE FROM Fortaleza, Brazil, and Seattle to Sun Valley, Idaho, and Austin, calls Milwaukee “the greatest city on earth.” And he’s serious.

When Via and his wife Anabel planned to relocate from Salt Lake City in 2021, they made an extensive list of cities, and they are grateful that they ended up in Milwaukee instead of other places they considered like Charlotte, N.C.; Pittsburgh; or Phoenix, where his parents live.

One reason is that Via says his “climate anxiety” has been growing while he’s lived in the American West, in cities running out of water and whose air is frequently polluted by wildfire smoke or smog. When an earthquake struck Salt Lake City in March 2020, Via and his wife, who grew up in Mexico City, decided they’d had enough, and embarked on a search for a place to settle where they wouldn’t have to worry about water or earthquakes or fires. Milwaukee ranked highly because it’s relatively immune to natural disasters, has access to a huge body of fresh water—Lake Michigan—has affordable houses for sale, and is diverse, which was important to the interracial couple.

Now that they’ve moved, Via loves not having to worry about running out of water, not having to water his lawn because of Milwaukee’s frequent rains, and being able to keep his window open for a good chunk of the year because he doesn’t need air-conditioning.

Via, who is 39 years old, knows most people still aren’t considering the climate when they move—states beset with blistering heat and hurricanes like Arizona and Florida are still gaining population, fast. But “I can’t wrap my head around not considering factors like, Is there going to be water to drink in 30 years?” he says. “Or, What’s going to be the average outdoor temperature? Or, Is the local government making the changes needed to protect the things needed for human life?”

FOR DECADES, THE MIDWEST has been a region left behind as manufacturing and other jobs dried up. Milwaukee County’s population has shrunk 12.3% in the past 50 years. And while Sun Belt states like Florida and Texas grew from 2020 to 2022, Illinois, Michigan, and Ohio all lost population, according to the Council of State Governments. Of the 50 ZIP codes that have seen the largest increase in new residents since 2020, 86% were in Texas, Florida, and Arizona.

But some Midwestern leaders see their states’ resilience to climate change as a means of reversing this decline. They’re putting their immunity from severe weather front and center, investing in making their cities more sustainable, and not shying away from the idea they can



attract new residents like Via who are concerned about the climate. “As the climate continues to change and people make decisions about where they will move as individuals or where they will relocate or start businesses, folks will consider—do we want to do it in a place that’s more likely to see intense hurricanes and storms year over year, a place that has earthquakes constantly, a place where it is unbearable to go outside for weeks or months?” Milwaukee Mayor Cavalier Johnson says. “Or do they want to do it in a place that’s more insulated from these things, like Milwaukee?”

Similarly, the Citizens’ Research Council, a public-policy group in Michigan, recently published a report suggesting that climate migrants were one potential solution to the state’s declining population. Though Michigan has not historically prioritized its environment, the group argues, instead of putting industry first, focusing on natural resources could attract new residents and investments.

Midwestern cities and states that have long seen nothing but people



leaving are seizing on the opportunity. “Businesses in the Milwaukee region face a low risk of natural disasters, decreasing the risk to people and buildings,” brags Choose Milwaukee, a website trying to attract businesses to the region. Buffalo, N.Y., will be “a climate refuge,” Buffalo Mayor Byron W. Brown said in his 2019 state of the city address; the city has since appointed a climate-action manager to lessen its carbon footprint. Michigan’s economic-development website makes no secret that the state is “ranked No. 1 Best for Climate Change.”

Luring people to the Midwest will be a tall order—the region has been losing population for decades for reasons that are not changing overnight, including cold winters, lack of good jobs, and, in some states, high taxes. Leaders selling their locations as safe from climate change may not sway many people who are just looking for a warm and affordable place to live.

Still, just about every list of the “best cities for climate change” includes many Midwestern cities; *Architectural Digest* has Milwaukee

‘In general, people will be moving north and east.’

—JESSE KEENAN,
CLIMATE-ADAPTATION
SCHOLAR AT TULANE
UNIVERSITY

and Columbus, Ohio, in its top 10; Policygenius, an insurance platform, has Milwaukee, Columbus, and Minneapolis on its list. The top 10 list put together by Jesse Keenan, a climate-adaptation expert at Tulane University, almost exclusively consists of Midwest and Rust Belt cities, including Detroit; Duluth, Minn.; Milwaukee; Minneapolis; and Buffalo and Rochester in New York. Those aren’t the only cities that will benefit, Keenan says; many other places are benefiting from a change in preferences “but in general, people will be moving north and east.”

Of course, climate change is not the only reason people pick where to live—job opportunities and affordable housing are often top of the list. Today, many young people are also looking for places that are affordable and that have embraced the kind of urban planning that makes it easy to walk or bike around town, says Keenan. Minneapolis, for instance, has transit-oriented development and mixed-income housing. East Lansing, Mich., has urban density, which is more climate-friendly than places where you have to get in your car to go anywhere. “A lot of these things were done in the name of sustainability and better urban planning and mitigating carbon footprint, but they’ve also been financially successful” in that they attracted new people, he says.

FOR MANY MIDWESTERN LEADERS, the chance to reverse population decline is enough to suggest that they need to invest more in sustainability, walkability, and the type of projects that will appeal to people looking to make a change. Milwaukee’s Mayor Johnson, for instance, wants to build a protected bike-lane network across the city. Michigan Governor Gretchen Whitmer has unveiled plans for the state to generate all of its electricity from carbon-free sources by 2035.

“I don’t think we can just say, as a state, ‘The South is going to boil and we can just rest and people will come here,’” says Eric Lupher, president of the Citizens Research Council of Michigan. “We have to get the rest of our ducks in a row, so to speak, try to be better at trying to attract more companies.”

Indeed, for Via and some other transplants, the fact that some Midwestern local governments appear invested in preparing for climate change is appealing. Milwaukee is trying to remove highways and make its downtown more walkable, while places like Salt Lake City and Phoenix seem to be ignoring the challenges that lie ahead. “I was tired of living in places that made sense when there was 100,000 people living there,” Via says, “but that no longer made sense when there were millions of people—and nobody talking about it or doing anything about it.”

Milwaukee has portrayed itself as free from natural disasters like earthquakes and hurricanes, including on a PowerPoint it shows businesses considering relocating there, says Jim Paetsch, executive director of Milwaukee 7, an economic-development group. It used to be that people would laugh when they saw the slide and ask why he didn’t include locusts or other biblical plagues. “Nobody laughs anymore,” he says. □

5 ways to set boundaries around work

BY ANGELA HAUPT

SETTING BOUNDARIES AT work—in this economy—might seem like a pipe dream. Not be available 24/7? Not smile and accept every new assignment? Not push back when a colleague tries to steal your time?

It could be your best career (and mental-health) move: establishing expectations for what you will and will not tolerate is key to increasing productivity and well-being. “Boundaries are limits or personal rules that protect your time and energy and allow you to perform at your best,” says social worker Melody Wilding. “Everyone likes certainty and clarity, and that’s what boundaries provide.”

Sticking up for yourself is particularly essential, she adds, when you consider how many people are burned out or plain old fed up at work. According to the American Psychological Association’s latest Work in America survey, 19% of employees say their workplace is very or somewhat toxic, and 22% believe that work has harmed their mental health. Workers describe feeling emotionally exhausted, ineffective, and unmotivated, and admit to being irritable with their co-workers or customers. Meanwhile, only 40% report that time off is respected, 35% say their workplace culture encourages breaks, and 29% note that their managers encourage employees to take care of their mental health.

Enter boundaries. Setting them can be hard, Wilding acknowledges—but practice helps. With that in mind, we asked experts how to set boundaries around five common work scenarios:



1. If your boss routinely Slacks you at 10 p.m.

The line between work and home is so blurred, it’s practically indecipherable. If your manager repeatedly pings you after you’ve logged off for the day, consider communicating a boundary like this: “I’ll be fully present at work, but I need to know that I’m also permitted to fully commit to my home life,” suggests Amy Cooper Hakim, a practitioner of industrial-organizational psychology. If that’s not practical in your industry, and you’ll need to be at least somewhat available, you can still set a boundary. For example, you might say, “When I step out the door, I’m going to be with my family. However, I appreciate that urgent things happen, so I’ll check my email once a night at 9 p.m.”

2. If your time off is interrupted

You’d probably prefer not to take your colleagues along on vacation—but a stubborn few might insist on showing up in electronic form. Hakim advises sending your manager a note ahead of time: “I’m offline from X to Y. If you need me urgently and can’t reach this person, this person, or this person, give me a call and I will commit to responding within 24 hours.” That way, you won’t be leaving your employer high and dry—but you also won’t feel pressure to respond immediately. If you still feel guilty or worried that you’ll look bad, Hakim suggests repeating this mantra: “I respect myself enough to grant myself this opportunity to take a break. I deserve it.”

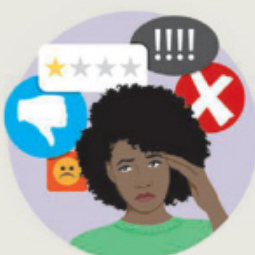


3. If your boss piles on—and on and on

Part of you is probably pleased to be your boss’s go-to; it means they recognize and appreciate your skills. But you also want a reasonable workload—research suggests that having too much to do can trigger burnout. Consider approaching the conversation from a big-picture angle, perhaps during a weekly check-in, suggests Alison Green, who runs the work-advice blog Ask a Manager. “Hey, my workload is really high,” she recommends saying. “Can we talk about how to prioritize? I’m going to need to say no to new things that come up, or take some existing things away.”

4. If your chatty co-worker won’t let you work

It’s 2 p.m., you’re slammed, and Rick from accounting has been leaning against your cubicle for 20 minutes. Don’t be afraid to be direct, Green advises: Tell your colleague you have something you need to get done by 3. You could also communicate a boundary silently, through actions—perhaps by looking at your watch or standing up. “Physically give the cue that you’re leaving your workspace,” she says.



5. If you crave a different style of feedback

Ideally, your manager will ask what type of feedback you need to succeed. But maybe that hasn’t happened—and your boss’s gruff, blunt style is getting to you. It’s a tricky situation, Green acknowledges, since you can’t change someone else’s behavior. “But I do think there’s room to have that conversation and say, ‘Hey, I appreciate that you’re giving me all this constructive feedback. I also need to know where I’m doing well. What should I keep doing?’”

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Mega-author John Grisham returns to his roots, in Memphis and on the page

BY MOLLY BALL

ON A RACK AT THE FRONT OF BURKE'S BOOK Store in Memphis is a postcard showing the shop in an earlier era, overhung by a billboard that's no longer there. GRISHAM IS COMING, it says in big red letters, next to a photo of the youthful lawyer turned author. His brow is knitted, mouth pursed. Below, a line of people wait for the store to open. John Grisham picks up the postcard and looks at it. "Oh, yeah, I remember those days," he says in his honey-thick drawl.

The image is from a book signing for *The Chamber*, in 1994. It's a memento of the heady days of his early success, when he released a succession of best sellers that became hit movies. People camped out in line for his signings, studios got in bidding wars for his film rights, and stores could barely keep his book in stock. Much has changed since. Publishing has fallen on hard times, while the legal arena Grisham writes about has never seemed more tormented.

What hasn't changed is Grisham's steady commitment. Since breaking out with the legal thriller *The Firm* in 1991, he's published at least one book a year—48 consecutive No. 1 New York Times best sellers, a feat no other writer has matched. This October, he's gone back to the beginning. His new book, *The Exchange*, is a sequel to *The Firm*, the 1993 movie version of which starred Tom Cruise as lawyer Mitch McDeere. The new book was inspired in part by Cruise's reprise in *Top Gun: Maverick*. Its release has Grisham feeling reflective. "When I started writing the book, I really got nostalgic," he says.

He's not the only one. A late-career Grisham renaissance may be in the offing. Feature films of Grisham's novels *Calico Joe*, *The Confession*, *The Partner*, and *The Racketeer* are all in development, while several others are being turned into TV series, according to his agent, David Gernert.

Grisham's books have shaped the way millions see the law and its discontents, tackling themes like racial violence, corporate greed, environmental destruction, and capital punishment. By his own account, he is obsessed with injustice, and often takes a novel as an opportunity to explore an issue. But he never wants readers to feel they're being lectured to, he tells me. "I don't spend a lot of time delivering messages," he says. "I want to tell a story in such

GRISHAM QUICK FACTS

It's elementary

Grisham served in the Mississippi legislature from 1983 to 1990. He ran, he says, seeking to end the state's shameful status as the only one in the union not to offer public kindergarten.

Almost famous

Grisham rarely gets recognized in public, and he likes it that way. "It's the perfect degree of fame," he says. "I tell people I'm a famous writer in a country where nobody reads."

By the numbers

The first print run of Grisham's debut novel, *A Time to Kill*, was just 5,000 copies. Today, his books have sold more than 400 million copies.

If it ain't broke...

Grisham's routine hasn't changed in many years. Starting on Jan. 1, he holes up to begin writing that year's thriller. Beginning around 7 a.m., he types on a computer disconnected from the internet, typically writing about 1,000 words per day. He begins by going over the previous day's work, and he is usually done by noon.

a way that the reader is caught up in it, and the pages turn."

On this late August morning, Grisham has come to Burke's to see the owners, his friends Corey and Cheryl Mesler, who—like every bookstore and Walmart in the country—are preparing for his book to drop. "Mitch is back!" Grisham tells Corey Mesler.

Grisham, now based outside Charlottesville, Va., grew up in small towns in Arkansas and Mississippi, the son of a sharecropper. He remembers picking cotton as a young child, fingers bleeding. He put himself through college and law school, then scraped by for a few years in private practice in Mississippi, hustling for clients, while also serving as a Democrat in the Mississippi house of representatives. Then, in his spare time—starting at 5:30 each morning—he drafted a novel in longhand, inspired by a court scene he'd witnessed. *A Time to Kill*, about a Black man who takes the law into his own hands after his daughter is raped by racist rednecks, and the lawyer who defends him, was published by an imprint of an obscure Christian press, and he implored local bookshops to stock it.

But Grisham was already at work on another book he hoped would be more commercial: the tale of a Harvard-educated tax lawyer from a humble background who moves to Memphis to work for a mysterious firm, only to find himself caught between the Chicago Mob and the FBI. "I set the book in Memphis because I hadn't been anywhere else," he tells me.

The Firm didn't have a publisher when a scout smuggled the manuscript to L.A., sparking an improbable bidding war and a \$600,000 contract with Paramount Pictures. By the time it was published in 1991, it was hotly anticipated. *The Firm* went on to sell more than 7 million copies.

It was on *The Firm*'s publicity tour, Grisham says, that he picked up a bit of career-defining wisdom: he overheard a publishing exec mention that the biggest authors—Tom Clancy, Robert Ludlum, Sidney Sheldon—tended to release a book a year. "It should be obvious to someone like me, who's a big reader, somebody who wants to write



◀ Grisham at the Peabody Hotel in Memphis

best sellers, but I'd never thought about that," he says. "So I hustled back to the farm in Oxford and finished *The Pelican Brief* in no time."

That discipline would make him rich and famous. Grisham tells the story with humility, as a series of lucky breaks for which he's grateful. It's also a story of the purest type of publishing success: a book by a nobody that succeeds on its own merits. *The Firm* changed everything for Grisham. He left the law and never looked back. For years, he and his wife Renee would refer to "BF" and "AF"—before *The Firm* and after.

IN MEMPHIS, GRISHAM AND I visit the Cotton Exchange, where Mitch, in *The Firm*, meets his accomplice Tammy as they're planning his turn

'When I started writing the book, I really got nostalgic.'

—JOHN GRISHAM, ON WORKING ON A SEQUEL TO HIS 1991 BEST SELLER *THE FIRM*

against his mob-front law firm. There's a plaque on the stately old stone building: JOHN GRISHAM, it reads in raised bronze letters, with several lines of text about his success and connection to the city. ("I had nothing to do with it!" he says of the plaque.)

In *The Exchange*, Mitch returns to Memphis on a legal errand and stays at the famed Peabody Hotel, taking a trip down memory lane that serves as a summary of the first novel's plot. Otherwise, there's little connection between the two stories. *The Exchange* takes place largely in New York City, where Mitch is a partner at a massive firm, and in Muammar Gaddafi's Libya, where he goes on behalf of a client. This Mitch seems less like the man from *The Firm* and more like a Tom Cruise character. And the ending feels less like a resolution than a cliff-hanger.

I tell Grisham I found the book perplexing, and kept waiting for the Mob to return. Grisham, in his disarming way, agrees with me. "That's the biggest problem with the book," he says, as if congratulating me for solving a puzzle. "Fifteen years later, where's the Mafia?" Here he is, one of the most famous writers in America, basically admitting his new book makes no sense, yet he does so merrily—with the good humor, perhaps, of an author who knows he's review-proof. It's a Grisham book; people will buy it; people will enjoy it; who am I to take that from them? "I decided to let it slide and see how many people comment on it," he says. "I think it works as is. But you do have that nagging question."

Grisham owes his career to *The Firm*; returning to it was daunting. "I was afraid to bring Mitch back because, you know, he'll always be the guy in my first big book," he says. "At the same time, you can't take this stuff too serious. Let's bring him back and have some fun. I like the story, now that it's done. And," he adds, "there's a possibility of doing it again." —*With reporting by* JULIA ZORTHIAN ◻

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The View

HEALTH

THE CASE FOR ANXIETY

BY DAVID H. ROSMARIN

Anxiety. The very word evokes discomfort. According to the U.S. Census Bureau, half of young American adults deal with it, so it's no wonder that this epidemic is causing us so much concern. But, as a clinician and researcher, I see a much bigger problem: in our society's quest to be anxiety-free, we tend to miss out on many valuable opportunities presented by this normal human emotion. ▶

INSIDE

POLAND'S UNEXPECTED
POLITICAL SHIFT

RUNNING FOR OFFICE
OVER AN ABORTION BAN

ANSWERING THE COVID-19
ISOLATION QUESTION

In and of itself, anxiety is not deadly. Quite the contrary: being able to feel anxious shows that our fight-or-flight system is operational, which is an indicator of brain and sensory health. Once we accept that anxious arousal is a normal, albeit uncomfortable, part of life, we can use it to thrive. Here are three ways anxiety can help you:

It can build your emotional strength and resilience

If you want to build emotional strength and resilience, you need to face some degree of mental adversity. Of course, traumatic events and abuse tend to cause more harm than good, but the experience of—and perseverance through—occasional anxiety, stress, and tension substantially increases your emotional fortitude.

For example, one of the most effective treatments for anxiety is exposure therapy, which involves systematically confronting one's fears, head-on, in reasonable and increasing doses over time. With the help of a therapist, individuals with phobias to anything from snakes or spiders to heights or medical procedures gradually encounter that which makes them anxious. As they exercise their emotional strength—voluntarily and courageously—they become desensitized to their anxiety, and its effects decrease.

In my clinical practice, I have treated hundreds of patients with exposure therapy, and in many instances, individuals emerge not only less phobically anxious, but also with greater resilience in general. In one particularly memorable case, I helped a young woman overcome a severe case of hypochondriasis (anxiety fixated on her health) with this method. Years later, when her newborn child had a serious health complication requiring lifesaving surgery, she handled the situation with incredible fortitude and calm.

It can increase your emotional intimacy and connection

Humans are social creatures. The No. 1 predictor of happiness and flourishing in late life is not great genes, financial success, or fame. It's the quality of



our relationships. Clinical science has identified that sharing our anxieties with our loved ones is one of the most effective strategies to build connection. When my patients learn to open up and share their anxieties with their partners, they almost always report a greater sense of emotional intimacy.

Even in the most secure relationships, we naturally feel some anxiety sometimes about whether the love we receive is truly unconditional. As relationship expert Sue Johnson teaches, when we embrace and express our need for connection during challenging moments (e.g., “I’m having a hard time right now and could really use your support”), it begets greater connection and turns our anxiety into love.

It can help you recalibrate and rebalance

From time to time, all of us find ourselves at the end of our rope. Our responsibilities pile up, our resources break down, and we just don’t have enough time to get everything done. We feel uncomfortably anxious most, if not all, of the time.

Many times, when my patients are overwhelmed they tend to take on more demands. Ironically, they take on additional projects at work, volunteer for community service,

and provide additional support to their friends.

It’s easier to avoid thinking about how overwhelmed we feel—and pretend that everything is OK—when we’re focused on work. But working harder, faster, and longer hours when one is already ragged can create chronic stress, which has been associated with heart disease, cancer, and stroke, as well as numerous less severe medical conditions.

When we feel genuinely overwhelmed and anxious because of stress, it’s our body’s way of telling us to recalibrate and rebalance. Nobody is truly limitless. When we heed our internal cues and acknowledge our fallibility, we emerge more focused and healthier overall—and also less stressed and anxious.

Anxiety can be a healthy, helpful emotion that is a constructive aspect of human life. It can foster emotional connection when we convey our vulnerable feelings to others. And in the form of stress, it can serve as an internal barometer to remain balanced and healthy. It’s about time we start putting it to good use.

Rosmarin is a professor at Harvard Medical School and author of Thriving With Anxiety: 9 Tools to Make Your Anxiety Work for You



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THE RISK REPORT BY IAN BREMMER

A boost for Poland's democracy, and the E.U.



IN POLAND, AN UNEXPECTED surge of voters ready for change has ousted a populist coalition government in favor of a pro-E.U., more moderate group of leaders. The Law and Justice Party, in power since 2015, won the most parliamentary seats. But its coalition partners didn't perform well enough to allow current Prime Minister Jaroslaw Kaczynski to form another government.

It's a striking win for politician Donald Tusk and his Civic Coalition. It's also great news for the European Union, which can expect a new government in Warsaw that will respect E.U. rules on democracy and rule of law. The biggest surprise on election day was a turnout estimated at 73%, the highest figure in postcommunist Poland's history. It's a result all the more striking given Kaczynski's unapologetic use of state media to boost his party's support.

Once in place, Poland's new government will work on making the changes its leaders have promised, and the E.U. has called for. In particular it will move to restore the political independence of the judiciary and media in line with E.U. rules. These reforms, in turn, will help Poland access as much as possible of the €35 billion that Poland can claim as part of the so-called Recovery and Resilience Facility, money that Brussels set aside for member states to help with pandemic recovery and the E.U.'s ambitious green- and digital-transition plans. The E.U. withheld that money from the previous government in response to its bid to bring judges and journalists under government control.

For the past several years, a populist government in Warsaw has boosted its popularity by demonizing the union, its rules on democracy, and its social policy. It has turned state-media outlets into a tool of government propaganda and stacked the country's courts with political cronies. It did all this secure in the knowledge that E.U. punishment depended on unanimous support and that its ally in

for populist parties in Germany, France, and Austria.

Caveats apply. President Andrzej Duda, a former Law and Justice Member of Parliament, will first invite the current ruling coalition to try to assemble a new government. That effort will fail, but it will take weeks to do so. Only then will Duda give the victorious opposition alliance its turn, meaning it's unlikely to have a

government in place before December. Even then, Kaczynski's Law and Justice Party will hold enough parliamentary seats to limit the new government's options, and both President Duda and conservative judges on Poland's top court will create obstacles too.

Finally, the new governing coalition will have internal divisions as well, particularly on social-policy questions like abortion restrictions and the political influence of the Catholic Church. The Civic Coalition must contend with both the Third Way's moderate conservatives and some

progressive hard-liners in the Left. The leaders of this new coalition will also face tough economic conditions, including low growth, high inflation, and a debt problem made more complicated by its plans to keep some of the more generous social benefits offered by the outgoing populist government.

But for Poland's winning alliance and its fans in Brussels, these are problems for another day. For now a major source of division between the E.U. and one of its biggest member states is on its way out thanks to an unexpectedly large surge of Poland's voters.



Tusk, leader of the Civic Coalition that will replace Poland's illiberal government, on election night in Warsaw

Hungary would veto any punishment. The E.U. has withheld badly needed funds to pressure Poland's government for change, but that strategy was undercut by the need to help Poland absorb Ukrainian refugees following Russia's invasion in February 2022.

IT'S NO WONDER THEN that Brussels is delighted to see Poland's voters eject that government and replace it with one that will be led by Tusk, a former head of the European Council. This political shift in Poland is especially timely for the E.U. given a recent election victory for populists in Slovakia and strong poll numbers



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The D.C. Brief
By Charlotte Alter
SENIOR CORRESPONDENT

Allie Phillips never wanted to be a politician, but she had always wanted to be a mom of two. When Phillips found out she was pregnant in November 2022, her 5-year-old daughter, Adalie, was thrilled too. “Her eyes got big and her jaw just dropped open,” Phillips says. She and her husband planned to name the baby Miley Rose.

But after a scan when she was around 19 weeks pregnant, doctors told Phillips that the fetus had problems with several organs—conditions “not compatible with life outside the womb,” a doctor told Phillips. Miley Rose would likely die before birth; the

longer Phillips stayed pregnant, the worse her own health could become.

Phillips, who lives in north Tennessee, could not get an abortion in her home state. After the Supreme Court overturned *Roe v. Wade*, Tennessee enacted one of the strictest abortion bans in the nation. Phillips and her husband had to travel almost 1,000 miles to get one. Shortly after she returned, she was approached by the Center for Reproductive Rights, which represents patients denied medically necessary abortions. She also met with her state representative, Republican Jeff Burkhart,



to ask his help writing a law expanding abortion options for parents in situations like hers. When Phillips told him about her pregnancy loss, “He said, ‘I thought women could only have a miscarriage in their first pregnancy,’” she recalls. (Burkhart did not respond to TIME.) “The lack of knowledge, the lack of education, is astounding.” That’s when she began to think

about running for his seat. It may be an uphill battle. Donald Trump won the county by double digits in 2020. But abortion bans have reshuffled politics—even in conservative areas.



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COURTESY OF ALLIE PHILLIPS



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Health Matters

By Jamie Ducharme

HEALTH CORRESPONDENT

AFTER MORE THAN THREE YEARS OF covering COVID-19, I've essentially become a human search engine for friends and family who have questions about the virus. And during this ongoing wave of infections, I've been struck by how many people are still wondering if, and for how long, they need to isolate if they get sick.

In fact, the U.S. Centers for Disease Control and Prevention's (CDC) policy hasn't substantively changed since late 2021. Its guidance still says that anyone who tests positive for COVID-19 should isolate themselves from others, including those in their household, for at least five full days. During that period, the sick person should skip in-person school or work, avoid other

public places, and, if possible, stay away from others at home. If that's not an option, the CDC suggests wearing a high-quality mask, such as an N95 or KN95, when around others.

After their five days of isolation are up, the CDC recommends that the person with COVID-19 wear a mask for an additional five days if they have to be around other people indoors. That's because studies show many people remain contagious for longer than five days. "COVID is not the flu," says Katelyn Jetelina, an epidemiologist who regularly interprets COVID-19 research in her popular newsletter. "We remain far more contagious for longer with COVID."

How do you know if you're still

contagious? Alyssa Bilinski, an assistant professor of health policy at the Brown University School of Public Health, says at-home tests are often more useful indicators than simply counting the number of days you've stayed home. **Studies suggest that at-home test results correlate pretty closely with contagiousness, so a positive result means you could infect others and a negative result means you likely won't.** False negatives are possible, though, so Jetelina recommends testing multiple times if you can.

The CDC considers a pair of negative results received 48 hours apart the sign you can remove your mask, even if it hasn't been a full 10 days since you got sick. It's wise to keep that guidance in mind as we head into winter illness season.



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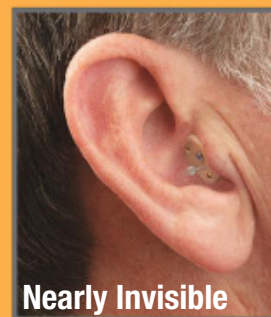
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WORLD

Loved Ones

ACROSS 75 YEARS, ISRAEL HAS BUILT itself around a military so formidable in battle that the country qualifies as a warrior state. But for the 2,000 years before that, the story of the Jews was one of perseverance through persecution, flight, and the kind of intimate, house-to-house slaughter Israelis awoke to on the morning of Oct. 7. What Hamas recorded on smartphones and uploaded to social media was a 21st century pogrom. The massacre of more than 1,400 people renewed and validated the dread that resides in every Jewish Israeli as a kind of inheritance—the embedded collective memory of trauma that has kept a society’s sense of confidence eggshell-thin even behind the most powerful fighting force in the Middle East.

What that military is directing onto the Gaza Strip—6,000 bombs in the first six days—had by Oct. 17 killed more than 3,000 people. For Palestinians, the Israel-Hamas War is likely the worst trauma since the *Nakba*, or “catastrophe”—as they refer to the 1948 victory of the Jewish army that, in establishing a Jewish homeland, exiled more than 700,000 Arabs who claimed the same land. Their descendants’ defiant presence in blockaded Gaza (where 2.2 million people are ruled by Hamas) and on the West Bank (where 3 million chafe under Israeli military occupation) has posed a persistent challenge not only for Israel’s security, but also for the moral code cultivated during the millennia that Jews had not a state, but a

tradition. Revenge hangs in the air over Gaza along with cordite. And just as no gentile can apprehend the horror of the Oct. 7 sabbath, nothing can communicate the experience of bombardment.

Imagine enduring both. The roughly 200 hostages Hamas carried away at gunpoint were awakened at dawn by the terror of a missile onslaught and faced the darkness of Gaza beneath the thunder of Israeli munitions. They form a kind of human bridge between two realms. “I can only hope that she is being held in Gaza,” says the son of 74-year-old Vivian Silver, a peace activist missing from her kibbutz. “What a terrible hope that is.”

With power cut off by Israel, accounts of the profound suffering in Gaza are largely being told from a distance. And in a conflict that has always been about competing narratives, Hamas ensured that attention would be on the hostages and their loved ones. The families speak wrenchingly about what they know and the torment of what they don’t. Searching for hope, they find themselves at the mercy both of terrorists and of the intelligence apparatus of an Israeli government that failed them on Oct. 7, then ignored them in the chaotic days that followed.

But they have their fellow citizens. After the worst loss of Jewish lives since the Holocaust, it was Israelis—the legions rising to donate blood, to prepare food, to report for duty—who confirmed why their nation exists. —KARL VICK

**PORTRAITS
OF GRIEF**
The stories of
Israel’s missing,
in the words
of their family
members

PHOTOGRAPHS BY MICHAL
CHELBIN FOR TIME

To read more from the
families of the missing,
and for updates on this
developing story, visit
time.com/israel-hostages

With reporting by Leslie Dickstein, Mathias Hammer, and Julia Zorthian





*Keren Schem,
mother of
captive Mia
Schem, with
daughter Danny
in Mazor, Israel,
on Oct. 16*

‘Bring my daughter home. She is only an innocent child.’

◀ KEREN SCHEM, 50

Schem's daughter Mia, 21, is missing after attending the Nova music festival

She went to the party Friday night with a friend. I woke up on Saturday morning and I saw what was happening. I called her: the phone was ringing and there was no answer. I called the friend too but his phone was off. The only thing I know is that Saturday morning at 7:17, she sent a message to one of the people in the party: “They are shooting us. Please come save us.”

I’m a single mom. I have four children. Mia is the second one. Mia is very, very creative; she’s very, very beautiful. She’s only just started her life. She’s painting, learning how to make tattoos. She is my best friend. She’s like a mother to my youngest girl. Every mom will say this about her child, but Mia was so, so special. She’s all my world. Their father is not part of their lives, and she’s very, very important to us, and she’s just vanished. I have no clue where she is. Mia is a real warrior, and I know that she will never give up and she will fight until the end.

I want to tell Mia that she is the love of my life . . . I want to tell Mia, if she hears me: I will do everything I can. And if they hear me, our cruel enemy, I’m telling them now: You can come here and you can take me. Bring my daughter home. She is only an innocent child. Take me and bring my daughter home.

—As told to Charlotte Alter



Yoni Asher, center, with family on Oct. 15 in Ganot Hadar, Israel, and portraits of his missing daughters Raz and Aviv

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‘Children and babies are not part of this war. They shouldn’t be part of this war.’

YONI ASHER, 37

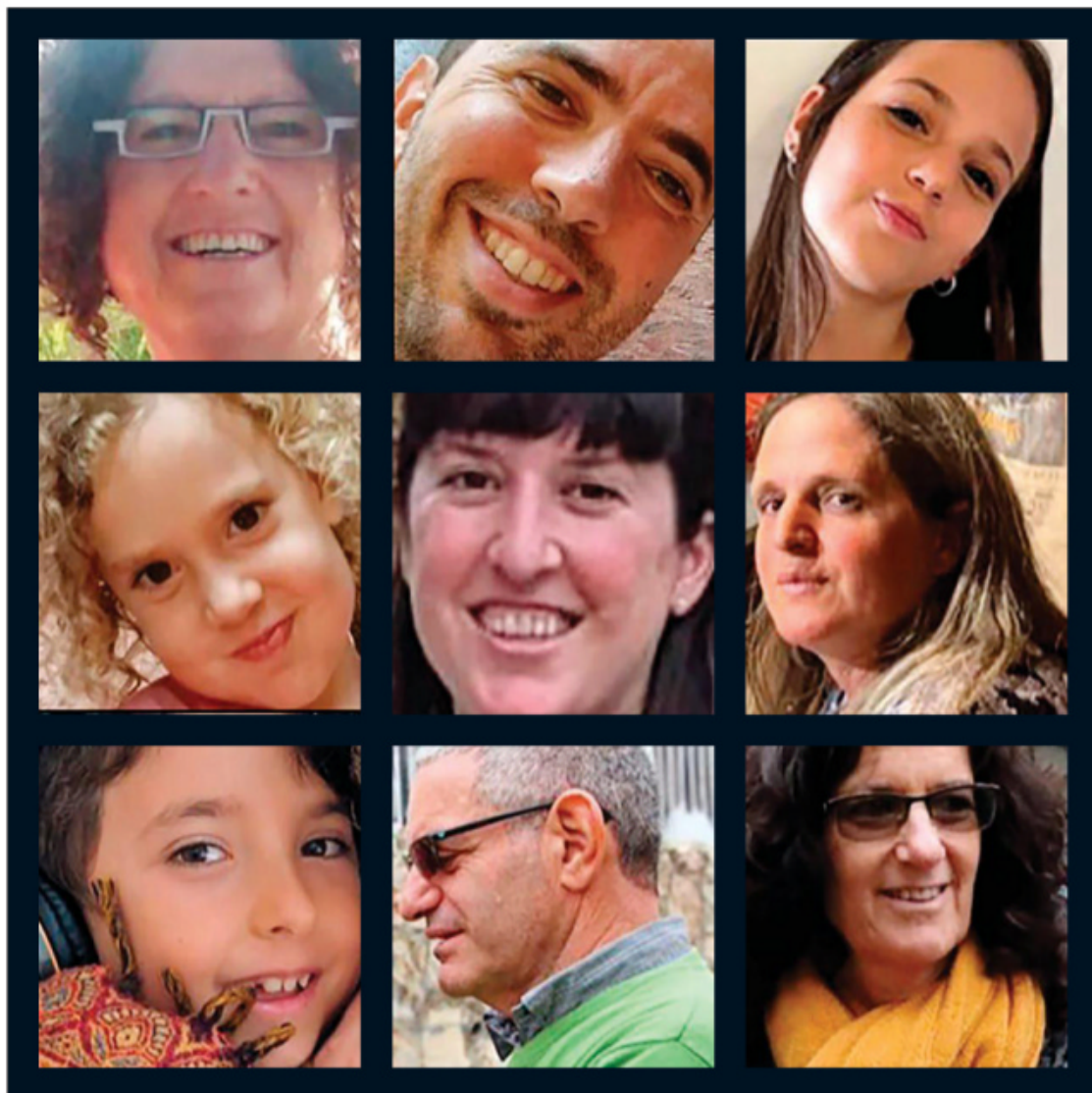
Asher’s wife Doron, 34, and his daughters Raz, 4, and Aviv, 2, are missing after the attack on Kibbutz Nir Oz

I wasn’t with my wife and my daughters. They were with their grandmother, my wife’s mother, in Kibbutz Nir Oz. In the morning, we spoke on the phone and she told me that they were locked and hiding and they could hear gunshots outside. She said that she heard people inside the house.

We stopped talking so that it wouldn’t endanger her. And unfortunately, this was our last conversation; I haven’t heard from her since. Not too much time later, I saw a video on social media, which unfortunately showed my wife and my two daughters on some kind of vehicle, and it appeared they had been kidnapped by Hamas to be taken to Gaza.

Children and babies are not part of this war. They shouldn’t be part of this war. Since Saturday, I’ve been without all of my family. These are my only daughters, and I just want anyone who can hear me, I’m begging you to do something so that I know that they are alive. They are young children. They need medicine and special food, and caretaking. How is this possible? Every day that passes is a catastrophe. I am terrified over their fate and I don’t know who to turn to anymore. All I can do is talk to anyone who will hear me.

—As told to Anna Gordon



*The missing members
of Haran's family*

‘Later on, we received a video of the house, which was completely ruined, burned down.’

SHAKED HARAN, 34

Nine members of Haran's family are missing after the attack at Kibbutz Be'eri

I WASN'T IN THE KIBBUTZ. I WAS in my home in Be'er Sheva. We woke up from the sirens for the missiles and we ran into the shelter, and we were there for a few hours. At this time my brother in the south of Israel started getting the news of what's going on and he started trying to communicate with my parents.

At the beginning they answered him. They were locked down in the shelter, eight of them together. It was almost all the family, except my uncle and aunt. They told my brother that they're keeping safe and they're following all of the orders and then at around 10:30 in the morning or 11:00 he tried to text them again. And they wrote back that they're in very big trouble and that they love us. And that

was actually the last text we received from them.

From that point on, we tried everything and anything to get in touch and to understand what's going on. But the reality in the kibbutz was like a horror film. We kept getting messages from people saying that they're being chased. There's gunshots everywhere. Houses are being set on fire. But we had no idea where my parents were, or my sister and her young children.

A friend of my father called him more than 100 times and eventually someone answered in Arabic. They said in broken Hebrew, “hostage, hostage, Gaza, Gilad Shalit [a ransomed Israeli soldier].” And so at that point, there was some indication that they had been kidnapped. But we still didn't know at that point if any of the Israeli forces reached their house, because the fighting went on for almost three days in the kibbutz.

We finally received a message

that the IDF forces were in their house but they didn't tell us what they saw or what's happening. Later on, we received a video of the house, which was completely ruined, burned down. Nothing really was left, but the shelter was empty, and they didn't find any bodies. And they didn't see any signs of blood or something like that. At this point, we realized that all of my family—including my 3-year-old niece and my 8-year-old nephew—have probably been abducted by Hamas. We had no idea if they're together or not, or what has been done. The only thing we saw was a video that Hamas released where we recognized my sister's husband being handcuffed and put into the back of a car. He was alive, so these were the only indications. We knew their cell-phone locations were somewhere around the Gaza border. But ever since then, we have no new information and we have no idea if they are alive, if they are together, where the children are, if they are being kept safe.

We know nothing. Honestly we feel like this is another terror attack. First there's the terror attack itself and then there's so much that is unknown. We're eight days into the situation and we have no idea of anything. If you look at the list, you see that so many are elderly people and children and women. My parents and my uncle take medication that is really critical for them. We haven't received any information, not from the Red Cross and not from other organizations so this is the situation now. I'm 30 weeks pregnant right now. The first few days were unbearable. I was frightened that I was not going to manage to stay healthy. But once we understood that the odds were that they were abducted and they might still be alive, we tried to take all our energy and power because there's still hope for us. There's some hope. We're not naive, we know the situation, but we're trying to hold on to this hope.

—AS TOLD TO ANNA GORDON

Jonathan Polin,
right, and
Rachel Goldberg
in Jerusalem on
Oct. 15



‘The first message said: “I love you.” The second message said: “I’m sorry.”’

JONATHAN POLIN, 53

Polin’s son Hersh Goldberg-Polin, 23, was injured and abducted at the Nova music festival in southern Israel

MY WIFE AND I BOTH GREW up in Chicago. We then were living for professional reasons in California, where Hersh was born. We moved when he was 4 to Richmond, Va. And when he was 7, the family moved to Israel, in July 2008.

Friday night, Hersh was home with us in Jerusalem. And at 11 p.m., he came and said goodbye to us. He had a backpack on and he was going to meet up with his friend, Aner Shapira. We didn’t know where they

were going. We just figured they were going camping.

Saturday morning, I got up and left at 7:30 to go to the synagogue. I was hearing booms and figured there was something going on, but didn’t know what. I got home at about 9:30. My wife immediately showed me that she had turned on her phone, which she doesn’t normally use on Shabbat, because it’s prohibited on the Jewish sabbath, and showed me that we had received two back-to-back text messages from Hersh at 8:11 a.m. The first message said: “I love you.” The second message said: “I’m sorry.”

We knew he was in some sort of distress, but we

didn’t even know where he was. My daughter got online and saw that there was a big music festival in the south. My wife reached out to Hersh and Aner’s third very close friend, and that third friend confirmed that they’d gone to the festival.

From about 1 p.m. Saturday until now, we’ve had an ongoing mini-situation room set up in my apartment. We had two different friends each go to a different hospital in the south to see if they could find our son. They went through unidentified bodies and did not see him. At some time, a picture started to circulate online that was from an outdoor bomb shelter.

Our son was in the picture, as was Aner. Through social media, we started to search for other families of people who were in the shelter and to try to piece together a story: Sometime around 7:30 Saturday morning, those in the bomb shelter came under heavy gunfire. People were being critically wounded. And what we next know from witnesses is that at roughly 9 a.m., gunmen came into the shelter, and they said anybody who can get on their feet and walk out of here, walk out. And our son was one of some small number of people to walk out.

The witnesses who have shared this information have confirmed that our son’s left arm had been severed from the elbow down. He’s a lefty. And he was bleeding. But he’s a trained medic so he had fashioned for himself a tourniquet. Witnesses say he was taken onto a pickup truck under gunpoint and the truck drove off. That’s the last time anybody that we can identify saw him. The Israeli police identified a ping to his telephone at 12:45 p.m. on Saturday on the Gaza border. From that time, we don’t know where he is. We don’t know what condition he’s in. We don’t know if the truck pulled away and threw him on the side of the road and shot him. We don’t know if he was taken into Gaza. We have no idea.

Right now we have a team working full speed with the No. 1 goal being get Hersh the medical treatments that he needs immediately. Of course we’d prefer that being at home in Israel, but if not, then at least he can get it in Gaza. —AS TOLD TO ANNA GORDON



Liri, Roni, and Gili Roman on Oct. 16 in their father's apartment in Tel Aviv, where Yarden was planning to live with her partner and daughter. One of Yarden's paintings hangs on the wall

‘We hoped to hear from her that everything is fine. That didn’t happen.’

RONI ROMAN, 25

Roman's sister, 35-year-old German-Israeli citizen Yarden Roman, was kidnapped from Kibbutz Be'eri

WE WERE ALL TOGETHER, ALL THE FAMILY, THREE weeks of travel in South Africa with Yarden and her partner Alon and their daughter Geffen. They were just heading back to Israel for the holiday eve on Friday, and they were staying with Alon's family in Kibbutz Be'eri. Me and my father, we stayed in South Africa.

She sent pictures of her with Geffen in the shelter, saying that they're all right, and just waiting for it to end. From South Africa, we did not understand what was going on and how unusual this was. Half an hour had passed, and then one hour, and then two hours, and there was no connection. We were just starting to understand that this is an extremely unusual situation—that there are terrorists that got into Israel, and that they were everywhere.

We decided to go on the road, a 15-hour drive to the airport, to go back to Israel. We hoped that we would have

more information and we will hear from her that everything is fine. That didn't happen.

When we landed, we got a call. The brother of Alon got a call from him from another cell phone saying that he is here with Geffen, healthy. They got to the army and they are OK and they are on their way to us. But he doesn't know where Yarden is.

[Alon's brother] told us the story. They were in the shelter when those terrorists came to their house. They took Alon, Yarden, and Geffen to a car that went to the [Israel-Gaza] border. Just before the border, Alon and Yarden decided to jump out of the car to try to escape. Geffen was in Yarden's arms. She is 3 years old, so she literally held her in her arms. They were all barefoot and wearing pajamas. They started to run, and when the terrorists started to run after them and shoot at them, Yarden passed Geffen to Alon because she knew that he can run faster. Yarden found a place to hide, and Alon also, but it was much further than Yarden was, and that was the point where they were separated. Alon and Geffen were hiding for almost 24 hours. He didn't know what happened to Yarden. All night, he heard [the terrorists] going around them and looking for them, so he couldn't reach out.

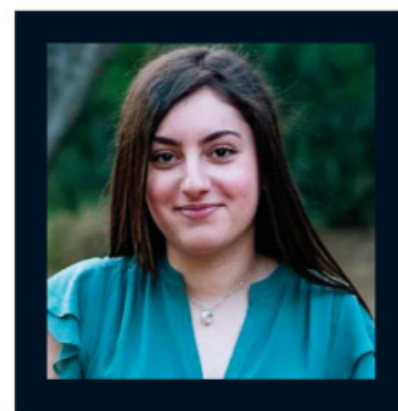
My oldest brother Gili went back to the fields to look for her because we had hoped that maybe she is still hiding somewhere. Alon also went to the field to look for her. They spent four days searching. We didn't find her. We're pretty sure that they took her and that she's in Gaza, although we don't know it for sure, because we didn't get any information about her. Right now, her status is missing.

My sister was working as a physical therapist. She lived in the kibbutz for four years, until this year. She was doing her studying in Sheikh Jarrah, in East Jerusalem. She is quiet and humble and she has a really good connection to people. She has a lot of empathy and care. This is really the person she is, and this is who she was also for me. My mother had cancer and passed away last year. This year, Yarden was for me really a mother.

Right now, I'm really focusing on her health and that she will be OK over there and that she will be back. I'm not a politician. There is a lot of pressure everywhere. I can understand that the situation is really complex and there is a war right now. And this is making the whole story really complicated because this is not an army against an army. These are innocent people here that need to be saved.

We're all together with Alon, with Geffen. Everyone here is playing with her and making sure that she's fine. Right now, she knows that mama is missing. She doesn't know why, or how, or the details of anything. Obviously, she was there, but she didn't understand what was going on. I'm sure that she understands that this is a serious issue because she is just acting perfectly and not crying at all, not yelling—just being the best child that she can. This is not usual. This is her understanding what she should do to help her mother. I hope that she will get her back. —AS TOLD TO YASMEEN SERHAN

'The only thing that we want now is that my sister, my parents' child, comes home.'



Karina Arieiev, who is among the missing

SASHA ARIEIV, 24

Arieiev's sister, 19-year-old IDF soldier Karina Arieiev, was taken hostage from her army base

She called us in the morning and she said that the base has been raided and attacked. She basically called to tell us goodbye. And so, if she won't live, she asked us to continue our life. The last message was: "The terrorists, they are here."

A few hours later, we identified her in a video. This was a video that the terrorists took and then published on their Telegram channels. This is our last confirmation that she is alive. She is alive on the video, but we don't know what is going on now. We know that they probably took her. She was in their jeep, with other girls. We went to the police to show them the video and to say that we identify my sister so they can do something. The same evening, military officers came to our door and they said to us that my sister Karina is held in the hands of a terror organization. From this moment, we do not know any other information.

We sit, watch TV, and hope for the best. Our family supports us. Many people from our work, from the school that my sister was in, are sending lots of

food. They are very warm. We feel that all the Israeli people, you know, they just came together to be one big family and the only thing that people want now is our hostages to be back; our children to be back. We do not care about bombing Gaza, going on the ground operation. The only thing that we want now is that my sister, my parents' child, comes home.

She's all I have, you know. I love my parents and all, but she's the one my heart belongs to. She's the only one I love in this world, the only one I want to be with me. She always comforts me. Even [though] she's my little sister, I can always come to her and she will be logical with me and make me come together. She is very lovely. She is very innocent. She is very childish, although she is now a teenager. She likes to decorate her room. She likes stickers and the fluffy dolls of the animals. She loves to paint. She loves cosmetics; she is always doing my makeup. I do not understand anything about it. I remember the day she was born because the gap between us is five years. I was in the hospital and I saw her. All this life, since the moment she was born till now, is just rolling in my head like a film. —As told to Yasmeen Serhan

ESSAY

The world's job during the war

BY YUVAL NOAH HARARI

AVIV KUTZ, A MEMBER OF KIBBUTZ Kfar Aza, was a childhood friend of a very close friend of mine. Aviv and his wife Livnat and their three children have lived in Kfar Aza for years. Although the Kutz family endured many Hamas rocket and mortar attacks on their kibbutz, parents and children continued to hope for peace. Every year the Kutz family organized a kite-flying festival, meant to create a small peaceful space in the war zone. Colorful kites—some displaying peace messages—were flown near the border fence with Gaza. Livnat's sister, who participated in the festival in previous years, said that “the idea is to fly the kites near the fence, to show Gaza that we only want to live in peace.” This year's kite festival was planned for Oct. 7. A few hours before it began, Hamas terrorists invaded and occupied the kibbutz. All five members of the Kutz family were slaughtered.

The mind boggles at such atrocities. Why do human beings do such things? What did Hamas hope to achieve? Unlike conventional warfare that aims to capture territory, Hamas' terrorism is a form of psychological warfare that aims to spread terror and sow seeds of hatred in the minds of millions—Israelis, Palestinians, and other people throughout the world.

Hamas is different from other Palestinian organizations like the PLO, and should not be equated with the whole Palestinian people. Since its foundation, Hamas has adamantly refused to recognize Israel's right to exist, and has done everything in its power to ruin every chance for peace between Israelis and Palestinians, and between Israel and the Arab world. The immediate background to the current cycle of violence is the peace treaties signed between Israel and several Gulf states, and the hoped-for peace treaty between Israel and Saudi Arabia. This treaty was expected not only to normalize relations between Israel and most of the

Arab world, but also to somewhat alleviate the suffering of millions of Palestinians living under Israeli occupation, and to restart the Israeli-Palestinian peace process. Nothing alarms Hamas more than the possibility of peace. This is why it launched its attack—and this is why it murdered the Kutz family and more than a thousand other Israeli civilians. What Hamas has done is a crime against humanity in the deepest sense of the term. A crime against humanity isn't just about killing humans. It is about destroying our trust in humanity.

In its war against Hamas, Israel has a duty to defend its territory and its citizens, but it must also defend its humanity

HAMAS' CRIMES CANNOT be justified by blaming them on past Israeli conduct. Two wrongs don't make a right. There is much to criticize Israel for—for holding millions of Palestinians for decades under occupation, and for abandoning in recent years any serious attempt to make peace. However, the murder of the Kutz family and the many other atrocities committed by Hamas were not meant to restart the peace process, nor are they likely to end the occupation. Instead, the war Hamas launched inflicts immense

suffering on millions of Palestinians.

In its war against Hamas, Israel has a duty to defend its territory and its citizens, but it must also defend its humanity. Palestinian civilians deserve to enjoy peace and prosperity in their homeland, and even in the midst of conflict their basic human rights should be recognized by all sides. This refers not only to Israel, but also to Egypt, which shares a border with the Gaza Strip, and which has partially sealed that border. As for Hamas, it and its supporters should be excommunicated by humanity.

The aims of the Gaza War should be clear. Hamas should be totally disarmed and the Gaza Strip should be demilitarized, so that Palestinian civilians could live dignified lives within it and Israeli civilians could live without fear alongside it. Until these aims are achieved, the struggle to maintain our humanity will be difficult. Most Israelis are psychologically incapable at this moment of empathizing with the Palestinians. The mind is filled to the brim with our own pain, and no space is left to even acknowledge the pain of others. Many of the people who tried to hold such a space—like the Kutz family—are dead or deeply traumatized. Most Palestinians are in an analogous situation—their minds too are so filled with pain, they cannot see our pain.

But outsiders who are not themselves immersed in pain should make an effort to empathize with all suffering humans, rather than lazily seeing only part of the terrible reality. It is the job of outsiders to help maintain a space for peace. We deposit this peaceful space with you, because we cannot hold it right now. Take good care of it for us, so that one day, when the pain begins to heal, both Israelis and Palestinians might inhabit that space.

Harari is a historian, philosopher, and the best-selling author of Sapiens, Homo Deus, and Unstoppable Us

WORLD

Seeing Gaza

PHOTOJOURNALIST SAHER ALGHORRA DOCUMENTS

DESTRUCTION AND GRIEF IN HIS CITY BY SANGSUK SYLVIA KANG



SAHER ALGHORRA HAS LONG LOVED TO DOCUMENT both the beauty and challenges of life in Gaza. That's what first drove the 27-year-old Gaza native to become a photojournalist. But even Alghorra—who has already lived through the devastating 2008 and 2014 Gaza-Israel conflicts—was not prepared for what has transpired this month. “The humanitarian situation here is extremely catastrophic,” Alghorra tells TIME.

Hamas launched a surprise attack on Oct. 7 that killed at least 1,400 people in Israel. Gazans have been subject to thousands of airstrikes since then, and Israel imposed a total siege cutting off electricity, water, food, and medicine, on top of a 16-year blockade that already left most Gazans reliant on aid. More than 3,300 people have died in Gaza in this latest escalation, and more than 13,000 have been wounded, the Palestinian Health Minister said Oct. 18.

Child casualties make up a quarter of the total, Gaza

authorities told Reuters, and Alghorra's photos put those numbers in stark relief. In one, Omar Lafi mourns the loss of his nephew, with whom he was inside a market buying food when the nearby Al-Sousi Mosque in Gaza's Al-Shati refugee camp, set up in 1948, was hit by an airstrike. On a separate occasion, Alghorra recalls, he saw a father holding his daughter near Al-Shifa Hospital, exclaiming that he was planning to throw her a birthday party, before she was killed by an airstrike.

At least 700 children have died in Gaza since the Israel-Hamas War broke out. To grasp how deadly the

Plumes of smoke fill the sky from airstrikes in Gaza City on Oct. 7

conflict has been so far for Gaza's children, more children were killed in Gaza during the first nine days of this war than in 20 months of Russia's war in Ukraine.

And those who live have not escaped the trauma. Alghorra recalls meeting two children at the emergency room at Al-Quds hospital who had lost their father while escaping airstrikes. "They sat there crying. We tried to help find [him]," he says. Alghorra followed them until they finally found the man injured in a different part of the hospital. "They hugged each other and collapsed in tears."

ALGHORRA'S PHOTOGRAPHS SHOW the many ways Israeli airstrikes continue to overwhelm the 2.2 million Palestinians living in what is one of the world's most densely populated places. Families grieve next to lifeless bodies. Plumes of smoke fill the sky. Rubble fills the streets. A mother, injured after her house was hit by an airstrike the morning of Oct. 9, cries as she learns that her daughter has died. Patients inundate Al-Shifa, the city's largest medical complex, as thousands more seek shelter there. Homes are destroyed every day. "We see sadness and frustrations in the eyes of the citizens who lose their loved ones during the war," Alghorra says. "There are families that have perished entirely."

Amid the scale of death and destruction, health officials have resorted to storing bodies in ice cream freezer trucks, as cemeteries fill up and moving them to hospitals becomes too risky.

"The health situation is at risk of collapse," Alghorra says. His photographs from Al-Shifa illustrate the urgency on the ground. "There were emotionally difficult scenes that took a toll on us," he says. "It's a difficult feeling, and the smell isn't good. I went to the Shifa Hospital to capture images of suffering and sadness there, and all the sounds were chants and ululations ... There were many sounds of crying and screaming."

The hospital has warned that there is nowhere else for patients to go. "It's absolutely impossible to evacuate the hospital," Dr. Muhammad Abu Salima, the director of the hospital, told the *New York Times*. "If someone doesn't die from the bombardment, then he'll die from the lack of medical service."

Israel on Oct. 13 ordered the evacuation of more than 1 million Palestinians from northern to southern Gaza, ahead of an expected ground offensive. Israel says the order—which the U.N. has said is "impossible" to carry out—is meant to protect civilian lives. But the U.N. and others have warned it would cause a "humanitarian disaster."

The war has also been deadly for those documenting it. At least 17 journalists have been killed since the conflict broke out. Even so, Alghorra remains determined to continue his work. "We are all at risk here, but we follow safety guidelines regardless. This includes wearing press vests and moving cautiously based on our assessment of dangerous areas," he says, showing *TIME* his press attire.

"Photography is very important for documenting crucial moments," he says. "In this war, our role as photojournalists is to show the world what the Palestinian people are going through." □



Omar Lafi grieves on Oct. 9 by the body of his nephew, who was killed by an airstrike





“Must-see viewing for all of us who
are addicted to documentaries.”

CHICAGO SUN-TIMES



Subject

FEATURING ~~THE SUBJECTS OF~~
THE STAIRCASE THE WOLFPACK HOOP DREAMS
CAPTURING THE FRIEDMANS THE SQUARE

In Theaters November 3

TIME
STUDIOS

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GREENWICH
ENTERTAINMENT

TIME BEST

For our annual list of the year's most exciting innovations, TIME editors hunted through products and services to select 200 inventions that make the world better, smarter, or just more fun.



INVENTIONS 2023

WITH REPORTING BY
LESLIE DICKSTEIN,
MATHIAS HAMMER, WILL
HENSHALL, SIMMONE SHAH,
AND JULIA ZORTHIAN

A YEAR IN SPACE

Space travel is increasingly routine: humanity made a record 178 successful takeoffs into orbit in 2022. More interest—and investment—led to a spate of scientific advancement this year.

That includes efforts to better understand space, like **NASA's OSIRIS-REx**, which gathered samples from an asteroid, and the **Japan Aerospace Exploration Agency's Lunar Excursion Vehicle 2**, built to explore the moon. Other innovations turned their gaze back on our planet, like **NASA's TEMPO**, which monitors air quality in the U.S.; **Nuview's LiDAR Satellite Constellation**, planned to map Earth in 3D; and Pixxel's work to detect environmental threats with its **Hyperspectral Imaging Satellites**.

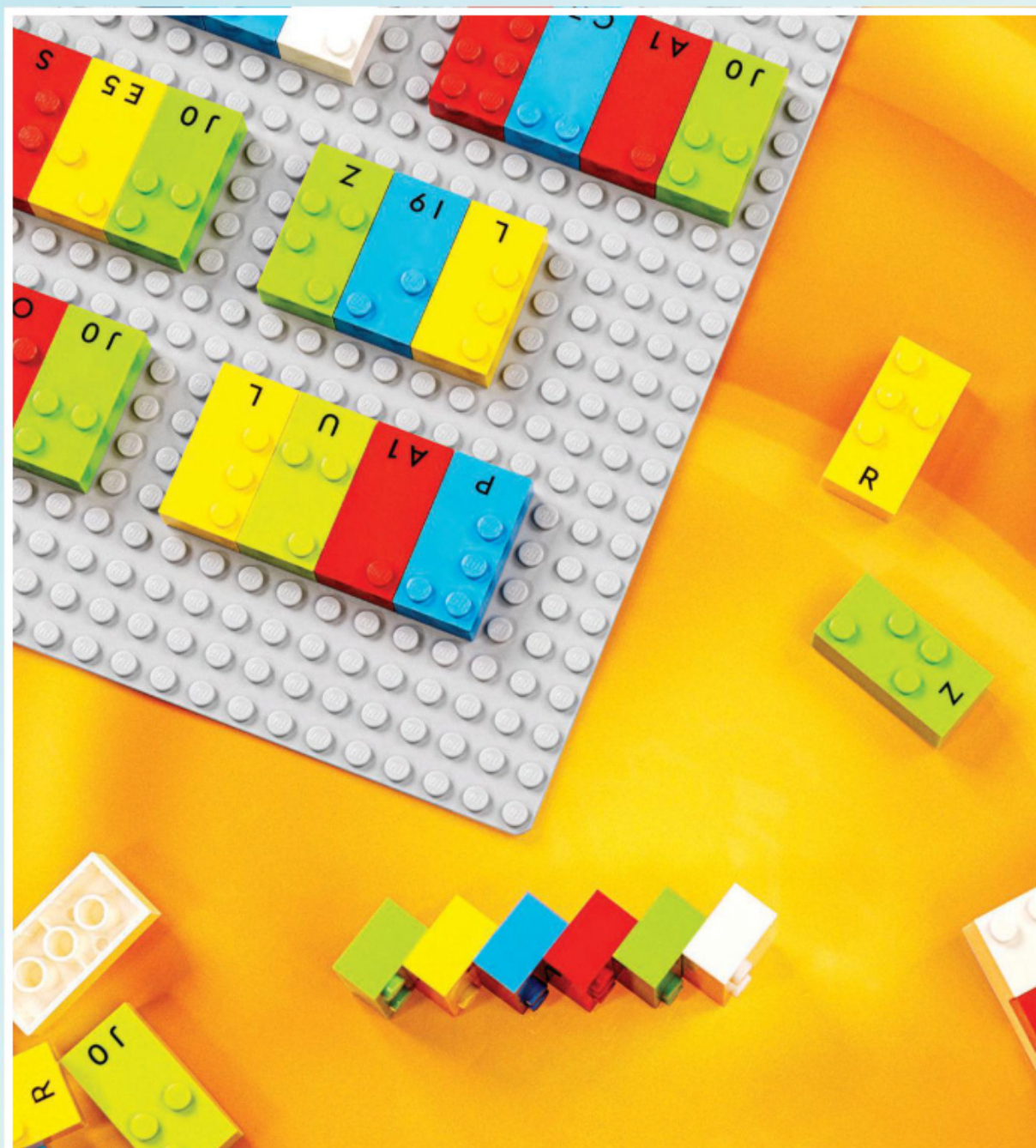
While scientists expanded the bounds of space exploration via **NASA's Moxie** experiment to separate oxygen from Mars' atmosphere, they also worked to reduce our impact and clean up space trash—which causes risky collisions—with the **ClearSpace-1** robotic arm. —Tara Law

OUTDOORS

Trunk show

ePlant TreeTag

After wildfires ripped through Maui in August, staff at ePlant set up 15 of their TreeTags on the Lahaina region's largest banyan tree, which had been damaged, to help arborists understand how to help it recover. The TreeTag sticks into the trunk, combining sensors and AI to measure growth, keep track of water and light inputs, monitor carbon capture, and store the data in the cloud. "Trees have their own unique way of communicating, and our sensors are like their translators," co-founder and CEO Graham Hine says. Anyone with trees in their yard will find the information helpful in keeping them healthy. —Pranav Dixit



DESIGN

Boundary-pushing instrument

Roland 50th Anniversary Concept Piano

Old meets new with Roland's 50th Anniversary Concept Piano. The Japanese Nara oak wood, preinstalled sounds from vintage Roland pianos, and the acoustic performance of a classic grand are all nods to the brand's history. Flying drone speakers float above the piano providing 360-degree sound, and a touch-screen panel supports videoconferencing and piano lessons. Only four have been made. "This is our vision for the home grand of the future," says Roland CEO Gordon Raison. —Jeff Wilser

DESIGN

Browsing, simplified

The Browser Co. Arc

The internet has changed a lot since the '90s. The browser hasn't. The Browser Co.'s free internet interface, Arc, is a modern take that caters to multitaskers with more viewing options. "Instead of one endless row of tabs you can barely read, let alone organize, Arc includes a vertical sidebar with room for everything," says CEO and co-founder Josh Miller. Users can easily save screenshots and share digital whiteboards. Every 12 hours, Arc closes and archives any unpinned tabs to reduce clutter; it's cleaned up over 100 million open tabs to date. —Jared Lindzon

TRANSPORTATION

More than a fast car

Czinger 21C

To make the wasplike 21C—one of the fastest street-legal, mass-produced cars ever—Czinger used the all-in-one Divergent Adaptive Production System (DAPS). In tandem with human input, generative AI engineered the car and 3D-printed and assembled the components, including the first fully printed suspension. It starts at \$2 million, but co-founder Lukas Czinger says it's not just a luxury: "Yes, it's hugely expensive. But it's doing something quite revolutionary." DAPS minimizes the amount of structural material by 15% to 40% and makes lighter, more efficient vehicles—reducing waste and streamlining the supply chain. —Alison Van Houten

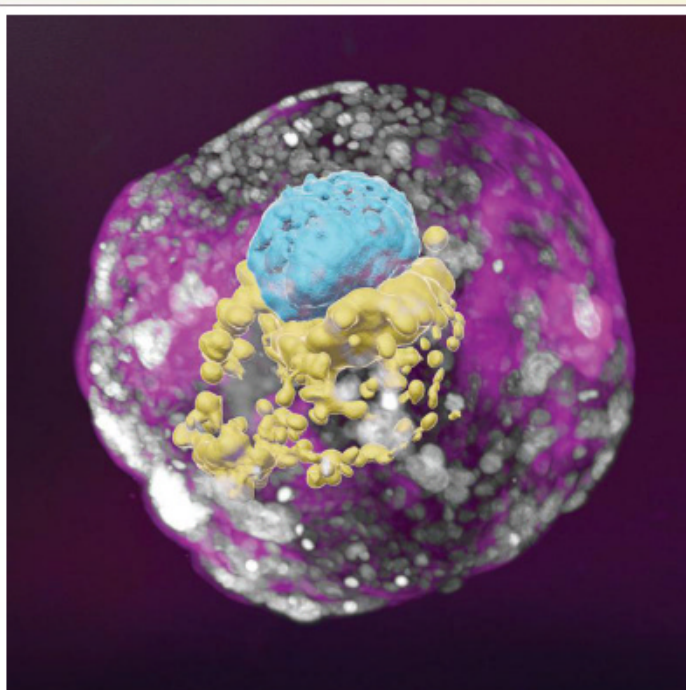




ACCESSIBILITY Playing with braille

Lego Braille Bricks

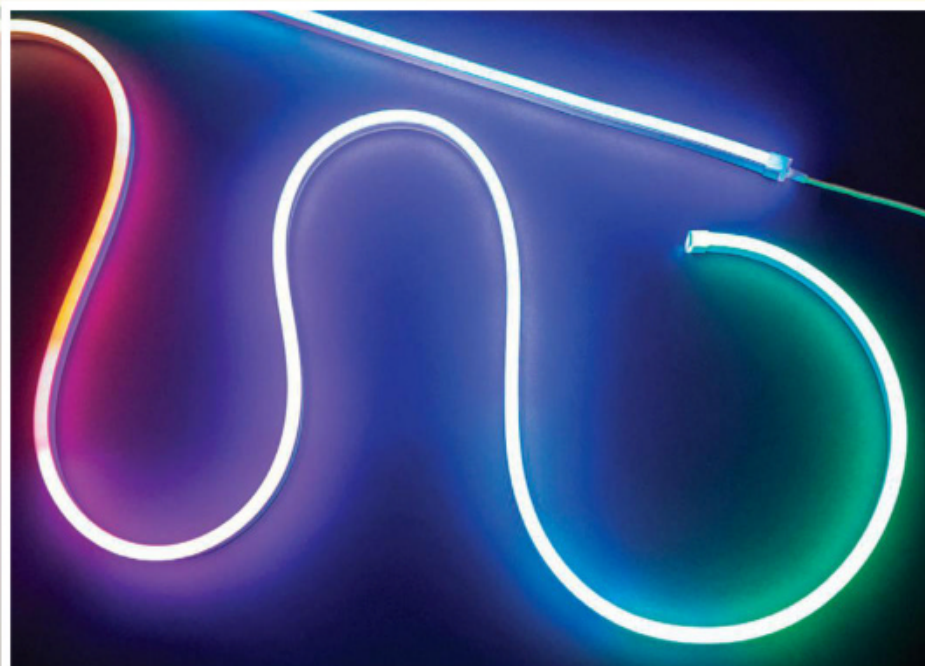
Once available only through schools and other educational institutions, Lego Braille Bricks—which teach visually impaired children necessary tactile skills—are finally coming to consumers' homes. The set (currently available in English and French, with more languages on the way) takes the classic 2x4 building brick and modifies its knobs to correspond with the braille alphabet, numbers, and symbols. The pieces are compatible with all Lego products. "We developed these for everyone, so even sighted children and family members can show their interest in learning braille," says Rasmus Logstrup Jensen, Lego's creative lead on partnerships and innovation. —*John Mihaly*



EXPERIMENTAL Studying life

Human Embryo Model

Because of medical and ethical challenges, there's much we don't know about the first few weeks of human embryo development, says biologist Jacob Hanna of Israel's Weizmann Institute of Science. Hanna's team used naive stem cells treated with chemicals to nudge them into becoming four types of cells found in early embryos. One percent of the treated stem cells spontaneously formed a structure similar to a human fetus, which researchers allowed to grow for 14 days. While distinctly not human, the model is close enough to give researchers potential insights into fertility, miscarriage, and more, for the first time. —*Katie MacBride*



HOUSEHOLD Light it up

GE Cync Dynamic Effects Neon-Shape Smart Lights

LED strip lights are increasingly popular in home-entertainment setups. But GE's Cync Dynamic Effects Neon-Shape Smart Lights are a little different from the kind most of us are familiar with. The neon rope lights include embedded microphones, which allow them to dynamically respond to the beat of the music or sounds from the TV. The product is a dream for anyone looking to create their own light shows or make their living-room viewing experience feel immersive. —*Chris Stokel-Walker*

DESIGN Redesigning the Big Apple

Group Project
New York City Better Bin

New York City's trash bins have a new look.

The iconic cans that have been largely unchanged since the 1930s—simple, green wire-mesh baskets—will be replaced with a sleek modular unit that is cheaper and also lighter, reducing the chance of injuries to sanitation workers. The Better Bin

also has a hinged flip lid to prevent dumping microwaves and TVs, and a perforated shell to impede rats. Colin P. Kelly, design director of Group Project, the firm behind the updated bin, says it "garners more respect, rather than just being this beat-up object." —*J.W.*



COOK SMARTER

Home chefs have long innovated their own efficiency hacks, but now companies are catching up. New inventions speed up cooking, like **Breville's Joule Turbo Sous Vide**, which cuts sous-vide time in half. Or they streamline tasks: the **Nama J2 Cold Press Juicer** reduces prep work, and the **Dreamfarm Fluicer** is a hand press that gets more juice out of your fruit. The **Spinn Pro** converts whole coffee beans directly into drinks.

Other devices improve upon existing appliances. The **Invisacook** induction stovetop doubles as a countertop and eliminates gas-stove toxins, while the **GE Profile Smart Mixer** adds a built-in scale and timed mixing. **Mill's** sleek composter can help you clean up more sustainably.

On the road, **EcoFlow's Glacier** cooler can both chill food and make its own ice, eliminating a trip to the store. And **Sweetgreen's Infinite Kitchen** locations robotically assemble your salad faster and more accurately, serving as a model for other chain restaurants. —*T.L.*

HEALTH CARE AT HOME

About 71% of people think often about their physical health, according to a 2023 Ipsos survey—and that's likely an understatement. It's no wonder, then, that many inventions aim to give users more control over their well-being.

Having accurate data goes a long way in staying healthy. The **COROS Heart Rate Monitor** straps to the upper arm and measures heart rate more accurately than wrist monitors, and the **Lumen** is a home breathalyzer that tracks metabolism in real time.

Some products speed up muscle recovery. The **Therabody RecoveryTherm Cube** relieves soreness via infrared and cryotherapy, while the **Lumaflex Body Pro** is an FDA-cleared red-light-therapy device for pain relief at home.

Other innovations aim to improve quality of life. The **Salistick** saliva pregnancy test liberates people from the urine test, while the **Vibrant System**, a vibrating capsule, relieves constipation without medication. And the **CAN Go smart walking cane** promotes independence with tools like fall detection and emergency calling. —Tara Law

ACCESSIBILITY

Control for quadriplegics

Naqi Earbuds

When David Segal's friend Keith broke his neck and pelvic bone at 18 and became a quadriplegic, his life changed immeasurably. Keith's experience led Segal to invent Naqi Earbuds, which he calls "a safe, noninvasive, universal, invisible, and silent command and control system." Electrical signals made by clenching your jaw or lifting an eyebrow turn into commands; wearers hear a voice to help navigate the invisible user interface. The still-in-development device could be used to control wheelchairs or smart-home items. Segal sees pro gaming as another arena for the tech.

—Chris Stokel-Walker



TRANSPORTATION

A supersmart e-bike

Acer Ebii

The Ebii, the first electric bike from consumer-electronics company Acer, has plenty of futuristic flourishes: a proximity sensor that automatically locks the bike when you walk away; built-in GPS to help in case of theft; a smooth, carbon belt instead of a greasy chain; and a battery that pops off and doubles as a portable charger for your laptop and phone. But it's the algorithmic smarts that set this bike apart. Sensors understand your pedaling force and elevation, and automatically adjust the electric power-assistance level for a smooth ride. No more gears. —Pranav Dixit

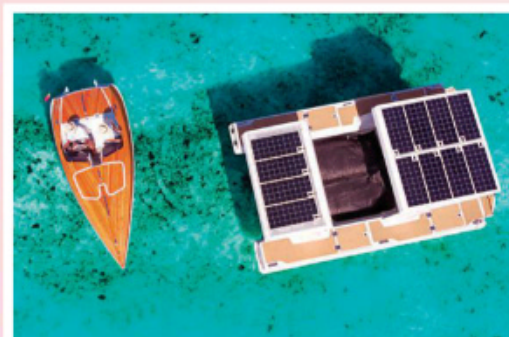


WELLNESS

A steadier hand

Cala kIQ

Essential tremor afflicts up to 10 million Americans, and most experience life-complicating shaking of the hands. Cala kIQ is a wearable, rechargeable device that sends electrical impulses from the wrist to the brain, to lessen the physical effects of misfiring neurons and temporarily let the wearer do things like hold a cup with more ease. It's also approved for patients with Parkinson's. A peer-reviewed study found that 80% of patients receiving the type of therapy delivered by Cala kIQ saw tremor power cut at least in half. —Jeremy Gantz



DESIGN

Cleaner boating

Faro Powerdock Set

The Faro Powerdock is a solar-powered dock that charges an electric boat with clean energy. "The boat can [then] be used to power other components or even provide power to the electrical grid," says Luis Marinho Falcão, partner and head of communications and sustainable growth at Powerdock manufacturer Faroboats. The setup also elevates the boat above the water, eliminating the need for harmful antifouling paints that keep sea life from attaching to the hull. The dock fits Faro's own speedboats and is planned to fit any electric or hybrid boat up to 12 m. —John Mihaly

BEAUTY

A salve for new ink

Mad Rabbit Tattoo Repair Patch

The healing process for a tattoo can involve pain, infections, and allergic reactions. But the usual treatment of petroleum jelly can create scabs that might distort the ink. "It turns out the age-old recommendation was a bad one," says Mad Rabbit co-founder and CEO Oliver Zak. In the interest of faster and safer healing, Mad Rabbit's tattoo repair patch is made from water-based hydrogel, which keeps the tattoo hydrated (minimizing ink loss), avoids allergic reactions from latex, and offers 99.8% UV resistance to shield your tat from the sun. —Jeff Wilser



AI

Breaking down beats

AudioShake

When one of the biggest rock bands recently landed a deal to use its hit 1970s song in a commercial, its members were overjoyed. There was one problem: the admakers wanted only the instrumentals, and all the band had was the final mix. So the rockers' team approached AudioShake, whose AI program isolates elements of prerecorded audio to strip it into its constituent parts. "We make audio interactive and editable and make it possible to fuel these really practical uses that help artists make money," says co-founder and CEO Jessica Powell. —C.S.W.

FOOD & DRINK

Sweet success

ChefDoodler

As any pastry chef will tell you, sugar cracks quickly when hardened and needs intimidatingly high temperatures to melt. Which means that detailed sugar work on cakes and cookies often leads to frustration and burns. The ChefDoodler pen makes it simple, safe, and fun—like a hot glue gun for sugar decorating. Though it will also work with real sugar, the device comes with a flavor-neutral, diabetic-friendly sugar substitute, isomalt, that can be extruded in thin, moldable lines. One beta tester called it “a gingerbread house maker’s dream come true,” says Daniel Cowen, co-founder and CEO of maker 3Doodler. The gadgets are shipping to more than 1,500 Kickstarter contributors and early adopters in October.

—Jessica Klein



CONSUMER ELECTRONICS

Accessible filmmaking

Sony FX3

The high-end cameras used to film today’s blockbuster movies can cost upwards of \$100,000. But director Gareth Edwards (*Rogue One: A Star Wars Story*) shot his recently released sci-fi epic, *The Creator*, primarily on Sony’s FX3.

The camera can be purchased at electronics stores for under \$4,000, and most viewers won’t see a difference in quality. The FX3 is light and compact, but its real superpower is a dramatically high ISO (the sensitivity of the camera’s ability to capture light), which allowed Edwards to capture difficult night shots without the need for extra lighting. As the director said while promoting the movie, “You can basically film in moonlight.” —J.W.



EVEN MORE INVENTIONS

► **AlertCalifornia’s AI wildfire detector** uses AI cameras to detect wildfires earlier.

► **So-VITS-SVC** is AI software that’s gone viral for its uncanny ability to speak or sing like any musician.

► **LeapFrog Magic Adventures Telescope** is an advanced educational telescope for kids.

► **Intel’s Thunderbolt 5** is computer-connection tech with double the data-transfer speed of its predecessor.

► **Wavelogix Rebel Concrete Strength Sensors** measure concrete’s durability and need for repairs in real time.

► The **Human Defense Platform** detects and stops online bot fraud attacks.

► **GoBoat 2.0** is an inflatable electric boat that fits in a backpack.

► **Equatic** uses seawater electrolysis to remove carbon from the atmosphere and generate hydrogen, which can be used for clean energy.

► The **Columbia University robotic hand** is a prosthetic that uses touch sensors and machine learning to interact with more dexterity. —Emma Barker Bonomo

ADVANCED AGRICULTURE

Agriculture can't afford to ignore climate change. The industry, along with forestry and other land use, contributes about a fifth of global greenhouse gas, while the changing climate endangers farmers' livelihoods. But innovations may reduce the industry's impact.

Pivot Bio Proven 40 On-Seed uses microbes to generate nitrogen for plants, cutting back on synthetic fertilizer and emissions. The **Monarch Tractor MK-V** is a completely electric, cloud-connected tractor that doesn't require a driver. And the **Ryse Recon** is an electric aerial ATV—like a small personal helicopter—that lets farmers soar over fields that would be otherwise difficult to traverse.

Other devices reconsider humanity's relationship with animals and ecosystems. **Good Meat Cultivated Chicken** is one of the first lab-grown meats okayed for sale in the U.S. **Dalan Animal Health Honey Bee Vaccine** is the first USDA-approved vaccine for a plague that kills honeybees, and **BeeHome 4** is a hive that keeps bees healthy and ready to pollinate with AI and robotics. —Tara Law

MEDICAL CARE

Accurate insulin

Beta Bionics iLet
Bionic Pancreas

Nearly 7.5 million American adults take insulin, but getting the dosage right can be tough, says Ed Damiano, co-founder of Beta Bionics. Inspired by his diabetic son, Damiano spent 20 years creating the iLet, a credit-card-size, AI-powered smart device that links to a tube plugged into a patient's body. Similar to existing options, it monitors glucose levels every five minutes. Unlike others on the market, it dispenses appropriate insulin microdoses when needed. The device was approved by the FDA in May, and recently gained Medicare and Medicaid approval.

—Chris Stokel-Walker



AR & VR

Revolutionary reality

Apple Vision Pro

Just about every big tech company has tried to develop virtual or augmented reality headsets with mass appeal. Apple might be the first to pull it off. Unveiled in June and set to hit shelves in early 2024, the Vision Pro features micro-OLED displays, a dozen cameras, six microphones, five sensors, and a new Apple-designed R1 chip. There's plenty that makes this headset unique, including gesture controls—wearers can navigate with eyes, hands, and voice—and the sheer number of apps it supports. An external screen shows users' eyes to communicate their immersion as they toggle between augmented and virtual reality. CEO Tim Cook says the aim is to "blend digital content with the physical world in a profoundly new way." —Jared Lindzon



DESIGN

For flexible work

Lenovo Yoga Book 9i

Lenovo's Yoga Book 9i was built based on the ways people actually use their computers in the remote-work era. "The original idea came from being in a coffee shop and seeing multiple people take their laptops, elevate them on stands, and then use little accessory keyboards," says Brian Leonard, a vice president of design. The portable, two-screen setup (each 13.3 in.) has four configurations: a classic PC, a tablet, a tent position, or standing. It's the world's first OLED dual-screen laptop, and can expand apps across both screens with a single hand gesture. —John Mihalay

EXPERIMENTAL

Weeded out

Seaweed Generation AlgaRay

Invasive sargassum seaweed helpfully absorbs CO₂, but also washes ashore in huge quantities from the Gulf of Mexico to Florida, emitting a foul-smelling gas and hurting ecosystems and tourism economies. The AlgaRay robot glides through the sea, scooping up floating mats of the plant. It then dives 200 m, where pressure and gravity sink it to the seafloor, taking the CO₂ it has absorbed with it. Seaweed Generation has a 49-year license for trials in Antigua and Barbuda while it develops an autonomous version of the bot.

—Alison Van Houten



ACCESSIBILITY

The beauty of stability

Lancôme Hapta

Loss of dexterity caused by conditions like strokes or arthritis can make applying lipstick tricky. The Hapta by Lancôme is a lipstick holder that uses stabilizing tech and adapts to users' needs to get their lipstick on evenly, in a smooth swipe. Guive Balooch, global managing director of augmented beauty and open innovation at L'Oréal, says the company hopes to take the tech beyond lipstick. "No community should be removed from the ability to use beauty products," he says. —T.L.

FOOD & DRINK

Tastemaker

Heinz Remix

Personalized sauce dispenser Heinz Remix is coming to restaurants, stadiums, and movie theaters in early 2024, perhaps sooner. Using a touchscreen, you select one of four "bases" (ketchup, ranch, BBQ, or Heinz 57) and add tweaks and spices to customize the flavor. The machine is capable of 200 combinations, with names like Jalapeño Ketchup and Smoky Chipotle Mango BBQ. Meanwhile, it feeds data on customer preferences to Heinz, which will use it to inform future recipes. —Jeff Wilser



OUTDOORS

Avian AI

Bird Buddy

Bird-watching just got high-tech. Buddy's wi-fi-connected, battery-operated bird feeder has a discreet camera that snaps high-quality pictures and videos of your feathered friends and sends them right to your phone. Even better, each image

is processed through Bird Buddy's own AI model, which can quickly identify over 1,000 species. And if it can't name a certain bird, worry not—an Ask the Community feature lets other users figure it out for you (a staffer reviews it for accuracy). In September, the company added the Bird Buddy Explore feature, which is like streaming for bird watchers: anyone with the app can check out feeds from dozens of Bird Buddy cameras across the globe. —Pranav Dixit

PARENTING

A safer smartphone

Bark Phone

Most kids want a smartphone; many parents are wary. Bark Technologies has a solution for teens and tweens: a customizable Android unit that lets parents manage contacts and track the device, while an algorithm monitors social media posts and texts for inappropriate content. And unlike other parental controls, "our algorithm is baked into the phone," says Titania Jordan, Bark's chief parent officer. "It can't be removed." —C.S.W.

TRANSPORTATION

A self-driving first

Mercedes-Benz Drive Pilot

Current cars' "self-driving" modes still require hands near the wheel and eyes on the road. But with an advanced new multi-sensor system called Drive Pilot, Mercedes-Benz's 2024 S-Class and EQS Sedans are the first cars certified for Level 3 self-driving in the U.S. (in California and Nevada). It means that under certain conditions (mainly highway traffic jams, with low speeds and a well-mapped road), you can completely cede control to the vehicle. —J.W.

EVEN MORE INVENTIONS

► The **LG Signature OLED M 97-in. Television** is the world's first to offer a wireless 4K transmitter, for visually lossless video without the cables.

► The **Keystone Tower Systems spiral welded wind tower** allows for easier turbine installation. Steel is shipped in flat sheets, and spiral welded on-site.

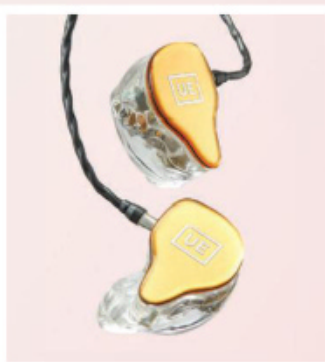
► **Framework's** new **Laptop 16** can be continually modified and upgraded by swapping out parts, even the CPU and graphics card.

► The **Muon positioning system**, developed at the University of Tokyo, picks up where GPS fails; it measures subatomic "muon" particles to determine location even through water and buildings.

► **Eion's Enhanced Rock Weathering** algorithmically measures how much CO₂ rocks and soil absorb, and how that process can be sped up by adding minerals.

► The **Sightful Spacetop** is a laptop that consists of AR glasses and a keyboard with touch pad. Put on the glasses and see a 100-in. virtual screen, anywhere.

► **CRG Automation Improved Cavity Access Machine** safely demilitarizes chemical weapons. —Emma Barker Bonomo



CONSUMER ELECTRONICS

Rich sound

Ultimate Ears Pro UE Premier

Ultimate Ears, which is known for the in-ear monitors your favorite musicians

wear during performances, has launched a new product that's a stab at the "ultimate listening machine," says Philippe Depallens, the product's general manager. The UE Premier earbuds, which require professional fitting, pack an unprecedented 21 drivers (the tech that converts

electrical signals into sound) into each side, for an immersive, detail-rich listening experience. The company hopes it will attract not only performers but audiophiles as well. "You will hear things in a recording that you've never heard before," says Depallens. —T.L.

BEAUTY

The home dermatologist

Lyma Laser

While examining a 62-year-old whose knee had been treated with low-level laser therapy to rebuild cartilage, Paul Clayton, Lyma director of science, noticed that the knee's skin looked 20 years younger. This

revelation sparked Lyma's handheld laser, which users can apply to the face or body while relaxing on the couch. Used just 15 minutes daily, it works to clear scars, rosacea, and wrinkles. Its 500-milliwatt laser "tricks your skin into producing more collagen," says founder Lucy Goff. Encased in medical-grade plastic, it's the first clinical-grade laser FDA-approved for at-home consumer use. —*Jessica Klein*



EXPERIMENTAL

A better prosthetic

Utah Bionic Leg

Science fiction is filled with high-tech prosthetics, but according to Tommaso Lenzi, an assistant professor at the University of Utah, real prosthetic legs for lower-limb amputees have been stuck in the 1990s. Enter a new bionic leg created by Lenzi and his team, capable of movement that's much closer to that of a natural leg and knee, making it easier to move around, including on stairs. The leg still needs more testing and FDA approval, but the team has partnered with prosthetics leader Ottobock to help bring it to the public. Testers have been excited to walk up steps for the first time in years, says Lenzi. "Hopefully, we can have more people walking, and get them out of a wheelchair," he says. —*Tara Law*



ACCESSIBILITY

Brushing away decay

Curaprox Samba Robotic Toothbrush

In more than 20 years working in the oral-care industry, Steffen Mueller has noticed one group that's consistently underserved: people with disabilities, nearly 88% of whom experience tooth decay. Some vibrating toothbrushes for

people with mobility difficulties leave them unable to clean hard-to-reach spaces, says Mueller, managing director of Swiss oral-health company Curaprox: "There's no movement in the mouth." The company's brand-new Samba Robotic Toothbrush corrects this. Shaped like a U and featuring 12,900 soft bristles, it moves around the gumline and oscillates at both high and low frequencies to cover every tooth and groove, with no motion required of the user. —*J.K.*



CONSUMER ELECTRONICS

Bedtime buddy

Loftie Clock

Smartphones make for problematic alarm clocks. When they're in your bedroom, you're tempted to squeeze in some extra screen time, which is bad for sleep quality. The Loftie Clock has many of the same features available on your smartphone—from white noise to guided meditation to a soothing wake-up alarm—without the urge to doomscroll. The device will even lull you to sleep with AI-generated bedtime stories, personalized to what you find relaxing. If the light's too bright, just hold down the snooze button and the clock completely darkens. —*Jeff Wilser*

FITNESS

A smart jacket

Nike Aerogami

Typically you have two options when jogging in the rain, and neither is particularly pleasant: don't wear a jacket and get wet, or wear one and sweat profusely. To address this conundrum, Nike designed its Aerogami jacket with tiny vents that pop open when they sense sweat, and close when your body cools off, thanks to a moisture-reactive film on the fabric. "This almost acts as an extension of our body's ability to regulate itself," says Jahan Behbahany, senior apparel innovator on Nike's Advanced Innovation team. Versions of the jacket marketed to women are for sale now, with men's to follow soon. —*J.W.*



CURAPROX, BIRDIE; ELIZABETH RENSTROM FOR TIME

THE AI REVOLUTION

Throughout history, innovations' potential to do good has been counterweighed by their ability to wreak havoc, or at least generate controversy. No recent tech illustrates this like AI, including **OpenAI's GPT-4**, the best-known large language model. When it launched in March, it shifted understanding of what AI can do and raised alarms around human replacement in just about every industry.

Some AI tools, however, simply limit the unpleasant parts of work, like **UiPath Clipboard AI**, which acts as a smarter copy and paste to speed up filling text into forms. Or **Adobe Liquid Mode**, which makes reading a PDF on a mobile device more user-friendly by allowing font-size changes and search.

AI has also powered up our creative abilities, regardless of our technical expertise. Consider **Adobe Photoshop Generative Expand and Generative Fill**, which enable people to seamlessly fill in imagined content beyond the borders of a photograph and easily alter pictures based on text prompts. Or **Runway Gen-2**, which can create full

videos solely from text prompts or other images or videos. Or **Stable Audio**, which creates music and sound based on a user's text inputs.

Then there's **Nvidia Neuralangelo**, an AI model that can convert 2D images into lifelike 3D replicas.

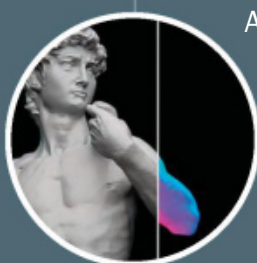
AI has even reduced boundaries between people. The **Humane Ai Pin*** attaches to your shirt magnetically and does many of the tasks smartphones can do—calling, texting, answering questions,

maintaining a calendar—all without a screen in front of your face. **Meta Seamless-M4T** can

instantaneously translate and transcribe conversations in nearly 100 languages. And the **Zoox Autonomous Employee Shuttle Service** has been bringing

the company's workers to and from the office since February, like an AI-powered car pool.

AI could also tackle a persistent problem for consumer goods: counterfeits. **Alitheon's FeaturePrint** uses AI to stop such theft, by analyzing photos to distinguish between real and fake products. —T.L.



HOUSEHOLD

Command center

Amazon Echo Hub

Smart homes are getting smarter, but that means a raft of apps and a tangle of cables. Thus, the forthcoming Amazon Echo Hub, the retail giant's first Alexa-enabled smart-home control panel. Talk to or tap the 8-in. screen to manage all your smart-home devices—it's compatible with over 140,000 gadgets, even ones from other manufacturers. "Millions of our customers have more than 20 devices connected to Alexa," says Melissa Cha, vice president of smart home at Amazon, "and we want to make it as easy as possible to manage and control those devices in a single place."

—Chris Stokel-Walker



CONSUMER ELECTRONICS

Safety on the job

Birdie+ Enterprise

One in 3 women experiences sexual or physical violence in their lifetime. That sobering statistic is a motivator for She's Birdie, the company behind Birdie+, a popular personal-safety alarm on a key chain that features a button users can tap to receive emergency assistance and a small handle they can pull to trigger a siren. In 2022, Goop became the first outside retailer to carry Birdie+, and in October, She's Birdie expanded its reach with Birdie+ Enterprise, a partnership program with businesses in industries like realty, whose employees tend to meet clients alone. —J.K.



DESIGN

The ultimate glamp

Romotow T8+

Combine the luxury of a yacht with the technology of *The Jetsons* with the functionality of an RV, and you've got the Romotow T8+, the mobile camper that looks like it came from an Apple Store.

Tow it via hitch, and when you arrive at your destination, just press a button and the entire cabin swivels 90 degrees from its shell. This reveals an L-shaped floor plan with sleek panels, modern decor, and a panoramic window. At \$270,000, the T8+ isn't cheap, but Romotow Holdings co-founder Matt Wilkie says it's built to last: "This is the sort of thing you pass down, and it's going to live 50-plus years." —J.W.

HIGH-TECH HOMES

Over 120 million households in Europe and North America had a least one smart-home device in 2022, per research firm Berg Insight. But the sea change has just begun: innovators have found a growing number of ways to give humble home appliances new life.

Take the **Hunter Douglas Aura Illuminated Shades**, which block the sun's heat for energy efficiency while simulating daylight indoors. Or the **RainStick Shower**, which sanitizes and recirculates water to save resources. Developed by a New York City apartment-building manager, the **Water Automation aqua-HALT** also conserves water (and prevents damage) by detecting moisture and stopping toilet leaks.

The kitchen calendar can be replaced by a **Hearth Display** wall-mounted touchscreen, which serves as a hub for all your family's to-do lists, schedules, and chore charts. And even the open flame has been updated by **Graphene Radiator's** futuristic warming virtual fireplace and the **BioLite FirePit+**, a Bluetooth-controlled firepit and grill that reduces smoke. —Tara Law



PARENTING

An on-the-go bottle warmer

Ember Baby Bottle System

Heating breast milk or formula for babies is notoriously tricky; they prefer it warmed, but their sensitive mouths can be easily scalded. Placing a full bottle in hot water is the most common method, but it's nearly impossible to do on the go. Ember's system avoids danger and headache with sleek, BPA-compliant bottles that attach to magnetized "pucks," which safely and evenly heat the bottles, are fully portable, and can be controlled via an app. The bottle's removable dome—sort of like a thermos—maintains temperature for four-hour stretches. —Jessica Klein

FOOD & DRINK

Crunchy convenience

Kraft Heinz 360Crisp

Microwaved food is convenient, but not as satisfying as fresh-cooked fare. Kraft Heinz has a solution: the 360Crisp process, which debuted with a new product, Lunchables Grilled Cheesies. The sandwich comes in a paperboard container with a susceptor that, when microwaved, directs heat to all the right places, leaving no bite undercooked or singed. "You have that perfectly crispy outside, that gooey melty inside, and none of that sogginess or dryness," says Alan Kleinerman, vice president of disruption. —T.L.



MEDICAL CARE

Visible cancer

Cision Vision InVision

Today's standard of care for finding lymph nodes, through which cancers spread, isn't quite high-tech: clinicians examine

samples of body tissue by hand. That's changing with InVision, a first-of-its-kind microscope that uses shortwave infrared technology to show lymph nodes contrasted against surrounding fat tissue. By enabling more accurate cancer staging, the tool could save lives. "You

end up with more suitable treatment plans," says Jeremy Li, CEO and co-founder of Cision Vision, which launched InVision in April. It is already in major hospital systems across the country, including Stanford and Northwestern.

—Jeremy Gantz

BEAUTY

A more strategic straightener

Dyson Airstrait

Hair straighteners have been a part of beauty routines since their invention in 1909. But they require dry hair, the hot irons can burn skin, and the devices weaken locks over the long run. Dyson has hit on a 21st century solution: the Airstrait. The straightener, used with wet hair, blows 11.9 liters of hot air a second through 1.5-mm slots at a 45-degree angle, speeding up the process while preventing the sort of damage created by scorching-hot irons. The machine is powered by the company's Hyperdymium motor. "It's more than 100,000 r.p.m.—five times faster than an F1 engine," says Low Chen Nyeow, senior design engineer at Dyson. —Chris Stokel-Walker





REUSE & RECYCLE

Cut kitchen waste

W&P Reusable Stretch Wrap

Plastic wrap and aluminum foil are fantastic kitchen aids, but people generally use each piece just once before tossing it in the trash. Now home chefs can cut down on waste by replacing them with W&P's silicone stretch wrap. At just 3 mm, it's about as thin as silicone can be without tearing. The reusable wrap can cover a casserole dish or stretch around a cheese block, and W&P says it's safe to put in the oven, microwave, dishwasher, and freezer. The product, says Kate Lubenesky, president of W&P, is "designed to be a workhorse in the kitchen." —J.G.

OUTDOORS

Boosted mountain biking

Trek Fuel EXe 2023

Mountain bikes make for awkward e-bikes. If you're climbing uphill and turning the bike to avoid rocks or trees, for example, pressing the electronic "burst" can be scary or even dangerous. So Trek built a new engine for its Fuel EXe electric mountain bike that provides smoother and more granular e-booster. It's also quieter, lighter, and 20% smaller than a typical e-bike motor. The Fuel EXe looks, feels, and sounds like a traditional mountain bike, so you don't even have to tell your friends you're getting a boost. —Jeff Wilser



HOUSEHOLD

Cleaner H₂O

LifeStraw Max

More than a million people die each year from unsafe drinking water, often in conflict zones or after natural disasters. To address this, LifeStraw invented a solution that strips water of bacteria, parasites, and viruses at scale. Its compact, 16-lb. system attaches to an existing water supply, cleaning 40 gal. of water an hour using hollow-fiber filters that block anything larger than 20 nanometers from passing through. "We wanted something that could work both at a refugee-camp level but also where you have flooding and wildfires," says chief brand officer Tara Lundy. —C.S.W.



EXPERIMENTAL

The drive to fly

Alef Aeronautics Model A

Plenty of startups are working on the sci-fi dream of flying cars, but not many look like, well, a car. "We started calling everything a flying car, and that was wrong," says Jim Dukhovny, co-founder and CEO of Alef Aeronautics. The company's Model A, a two-seat, all-electric vehicle with a flight range of 110 miles, indeed looks made to be parked in a garage. In July, the Federal Aviation Administration gave the vehicle a special airworthy certificate, allowing Alef to make test flights. The company hopes to deliver the first Model A's by 2026. —Alejandro de la Garza

EVEN MORE INVENTIONS

▶ **TrailGuard AI** uses AI-powered cameras to monitor endangered animals and catch the poachers that threaten them.

▶ **Samsung's Less Microfiber Filter**, installed in the brand's washing machines, catches microplastics that leach into wastewater from laundry.

▶ The **Adidas Adizero Adios Pro Evo 1** is the new super-light supershoe that runner Tigist Assefa wore to set a world record at September's Berlin Marathon.

▶ **Tabeeze Bottom-Up Bodysuit** is a onesie intended in part for babies in the NICU attached to monitors and tubes. It snaps at the shoulders instead of the bottom, and aims to ease skin-to-skin snuggling.

▶ **Plumis Automist** is a targeted sprinkler system that puts out fires faster with a mist that also reduces water damage.

▶ **Music: Not Impossible** is a haptic bodysuit that lets deaf and hard of hearing people experience music as vibrations.

▶ The **Axiom Holographics Hologram Zoo** in Brisbane, Australia, allows visitors to see animals up close and in action via holograms, no captivity needed. —T.L.

EVEN MORE INVENTIONS

► The **Sony Alpha 7R V** mirrorless camera uses AI to hold humans—or animals, cars, insects, etc.—in sharp focus.

► **Sharrow's MX Propeller** reinvents the traditional propeller, which hasn't changed in a century, making boats quieter and more efficient.

► Speaking of quiet, **Lockheed Martin and NASA's X-59** is the quietest supersonic jet ever designed. It's planned to take flight next year.

► The **Jackery Solar Mars Bot** puts solar panels on wheels. The small vehicle uses AI and light sensors to zip around terrain and seek optimal sunlight.

► **Lenovo's Rollable Laptop** prototype features an expandable screen that goes from 12.7 in. to 15.3 in. on the go.

► **Iambic's Model T** is a custom leather sneaker, based on photos of your foot and a comfort questionnaire. For subsequent orders, Iambic analyzes your tread wear.

► Bots have learned to evade CAPTCHAs, but **Arkose Bot Manager** is a new way sites can stump bots using a combo of 3D, visuals, and audio, without frustrating customers.
—Emma Barker Bonomo

ACCESSIBILITY

Smoother moves

Zeen

Each year, tens of thousands of people in the U.S. go to the emergency room after falling using walkers and canes. The Zeen was designed to be a safer walker, using a gas-spring technology that inventor Garrett Brown developed when creating the Steadicam movie-camera stabilizer in the 1970s. It allows users to smoothly move the chair up and down, so they can more easily shift between walking, standing, and sitting modes. "There was something missing between walkers and wheelchairs," says Brown, co-founder and CEO of Zeen maker Exokinetics. He believes the Zeen fills that void.

—Jeff Wilser



PRODUCTIVITY

Group speak

Catchbox Plus

A speaker poses a question to the audience—and thus begins the awkward dance of passing a microphone down rows and over heads. Catchbox reinvented that kind of audience and group participation by putting wireless mics inside plush boxes that can be tossed from person to person. The latest version, the Catchbox Plus, is a major upgrade, offering better sound quality, less lag, and a clip-on lavalier for the person leading the discussion. With more businesses embracing hybrid work, says Pyry Taanila, a company co-founder and chief design officer, the device is often used in meetings to make sure every speaker is audible. —Tara Law

REUSE & RECYCLE

Robotic recycling

AMP Robotics Cortex-C

Recycling rates have been stagnant for years. One big reason? Properly sorting crowded conveyor belts covered in a grimy array of glass, metal, and plastic is tricky and labor-intensive. AMP Robotics has a solution: the Cortex-C, a compact and adaptable robot for recycling facilities. Paired with AMP's AI-backed computer "vision" system, it can correctly identify, say, a specific strawberry company's plastic clamshell. "What's powerful about AI is its ability to handle ambiguity and imprecision," says CEO Matanya Horowitz. The robot's speed and accuracy could also lower sorting costs. —Jeremy Gantz



DESIGN

Otherworldly entertainment

Sphere

When the \$2.3 billion Sphere first lit up on July 4, "it was like something out of a sci-fi movie," says David Dibble, CEO

of MSG Ventures, which developed the Las Vegas entertainment venue's tech. "People got out of their cars and were just staring up." Its 366-ft.-tall exterior is earth's biggest LED screen—a lattice of 1,230,000 pucks that can make it look like a ball or planet or ... anything. Inside it boasts a 160,000-sq.-ft. curved screen and an advanced concert-grade audio system, both now put to use for a residency by U2. —Alison Van Houten

APPS & SOFTWARE

An e-passport

Digital Travel Credentials

Plane tickets, loyalty cards, and more have moved from wallets to cell phones. But one key document has not: the passport. Unless you're in Finland. In August, it began the world's first digital-passport program, for Finnish citizens flying on the national carrier, Finnair, between Finland and London; Manchester, England; or Edinburgh. To qualify to use the app, people must register with their local police, have their photograph taken, and sign a consent form. But once onboarded, all travelers have to do is get their phones scanned at airport immigration, and the fear of losing their one paper passport is gone. —Pranav Dixit



APPS & SOFTWARE

The language of song

Duolingo Music

Duolingo is bringing its gamified learning style—fun, bite-size sessions on your phone—to music later this year. The new curriculum, which is free with ads and will appear in the original Duolingo app, uses an on-screen piano to teach principles like harmony, meter, pitch, and beat. You learn by interacting with over 200 popular songs (from nursery rhymes to Beethoven's Ninth), matching sounds to notes and contributing to the larger musical piece. Karen Chow, a Duolingo senior learning scientist, says there's a misconception that you need innate talent to learn music, but "we're trying to break those boundaries—you don't have to feel intimidated." —J.W.

PARENTING

Lifesaver

Doona SensAlert

In the U.S. about 40 children die each year because they are left alone in a hot car. It's an extra risk for babies in rear-facing car seats, because they're not visible to the driver. SensAlert, a removable car-seat insert by car-seat maker Doona, uses sensors to detect the presence of a child to help prevent tragedy. New to the U.S. market, it automatically connects to smartphones via Bluetooth, and triggers three incremental alerts if a child is unattended in the car.

—Leslie Dickstein



REUSE & RECYCLE

Sustaining the chill

Cruz Cool

Styrofoam takes over 500 years to decompose—and yet we still use it for insulation. The Cruz Cool cooler, which can insulate frozen goods for 48 hours, is made out of chitin, a polymer that's

found in fungi, insects, and shrimp. But the real difference is how it's produced. Typically, eco-friendly alternatives to styrofoam come in odd shapes and sizes that flummox supply chains. Parent company Cruz Foam pounds the chitin into large flat pellets that snap into a partner's current processing plant. That's how Cruz Foam is already partnering with Atlantic Packaging, an industry leader. —J.W.



CONSUMER ELECTRONICS

Spatial sound

Sonos Era 300

Audio company Sonos began developing the Era 300 spatial audio speaker after Dolby released its groundbreaking Atmos immersive audio format. "The brief to the team was: 'How do you create one product that makes you feel like there are seven or eight speakers in the room?'" says CEO Patrick Spence. The result is the amazing Era 300, a single speaker that sounds like a full system. Almost every part, from tweeters to waveguides, was built afresh for the speaker. Spence says it's already in every Universal Music studio, where it's used to test Dolby Atmos track mixes.

—Chris Stokel-Walker

SUSTAINABILITY

New rings on the road

GACW Air Suspension Wheel

A decade ago, the smoke of a tire-dump fire prompted Zoltan Kemeny to investigate. He discovered that such fires are just one example of rubber tires' impact on the environment—everyday wear and tear leads to microparticle accumulation. So Kemeny invented Air Suspension Wheels, swapping out rubber for polyurethane or steel treads encircling a steel core. Kemeny's company, Global Air Cylinder Wheels, plans to sell its 100% recyclable tires to a number of industries, starting with the mining sector, where wear on tires is often most severe. —C.S.W.



GREENER POWER

When the **H2FLY HY4** became the first fully electric plane powered by liquid hydrogen to take piloted flight in September, it carried hope for a cleaner airline industry. And as EVs and solar panels proliferate, so do other green-energy innovations.

Form Energy's iron-air battery uses the process of rusting iron to outlast other batteries without using rare-earth metals, and the **Antora Thermal Battery** stores energy in blocks of carbon. **Brenmiller Energy's bGen** stores heat in crushed rocks that can create steam for industrial power.

New devices also aim to replace diesel, like **Moxion Power MP-75**, a battery-powered outdoor generator, and **Sesame Solar's Mobile Nanogrids**, which use solar and mobile green-hydrogen power in disaster zones.

Others make clean energy more accessible. **Oklo's Aurora Powerhouse** is a small, prefabricated nuclear reactor that makes the energy cheaper and safer. And **Dyaqua Invisible Solar Roof-tiles** are attractive solar panels that look like terracotta tiles. —T.L.

FITNESS

Smart boxing

Bhout Bag

The first AI-powered boxing bag is laced with sensors and comes with a 3D computer-vision camera, allowing it to measure the accuracy, power, speed, and technique of every strike—all in under 250 milliseconds. A companion app uses that data to create a personalized training experience; pugilists can also compete virtually in real time and soon will be able to earn “JAB\$” credits to exchange for prizes. The idea, says founder and CEO Mauro Frota, is to gamify boxing fitness.

—Jared Lindzon

MEDICAL CARE

Frontline OR

SurgiBox SurgiField

In war, injuries can’t always be treated in a sterile operating theater. “We offer high-quality care and safe surgery at the point of need,” says Debbie Teodorescu, founder of MIT spinout SurgiBox. Its SurgiField system is a three-part, battery-powered surgical environment: a bubble inflated from a backpack and pumped with filtered air. SurgiBox has donated dozens to Ukraine’s army; the country’s military says they’ve saved at least 31 lives.

—Chris Stokel-Walker



DESIGN

Sustainable sneakers

Zellerfeld 3D-printed shoes

Cornelius Schmitt, CEO and co-founder of Zellerfeld, has grand ambitions: to put fully recyclable 3D-printed shoes “on every foot in the world.” The startup currently uses 200 3D printers of its own design to create custom-fitted shoes based on smartphone scans of

the buyer’s feet. Each piece of futuristic footwear is made entirely of a single material, thermoplastic polyurethane, eliminating the sorting headaches that prevent mixed-material items from being recycled. At the end of their life—or the end of a season—the shoes can be sent back to Zellerfeld and turned into new designs. The company has worked with designers from Kanye West to Moncler on a range of sneakers and sandals, with more high-profile collaborations on the horizon. —Cheyenne MacDonald

PARENTING

Breakthrough bassinet

Happiest Baby Snoo Smart Sleeper

“Babies are used to sleeping with a rhythm [in utero],”

says inventor Dr. Harvey Karp, co-founder and CEO of Happiest Baby, maker of the Snoo. “Why should we rip that away the instant they’re born?” The popular bassinet lulls infants with automated rocking and shushing. It also secures them on their backs, reducing the

threat of sudden infant death syndrome—which is why, in March, the FDA granted De Novo approval to the Snoo, making it the first medical device to be approved for infant sleep. Happiest Baby hopes insurance coverage for the \$1,700 Snoo comes next. —Charlotte Alter



**CONSUMER
ELECTRONICS**

Powerful pixels

Canon MS-500

Even if a count of 3.2 megapixels per 1-in. single-photon avalanche diode image sensor means nothing to you, you can appreciate that combined with a super-telephoto broadcast lens, Canon’s new MS-500 camera captures sharp videos from some six miles away—even at night. The camera’s sensor precisely counts the number of photons, or light particles, in each pixel, explains Ryan Kamata, senior product marketing manager at Canon Europe, eliminating the image “noise” that plagues other cameras. Canon is marketing it to government agencies for surveilling sensitive areas. —Jessica Klein

ACCESSIBILITY

Walking with ease

Cionic Neural Sleeve

Frustrated by the mobility-support options offered to his daughter Sophia, who has cerebral palsy, Jeremiah Robison, founder and CEO of Cionic, set out to make a garment to power “a more normative gait.” Cionic’s Neural Sleeve, which began shipping in January following FDA approval last year, analyzes real-time data from sensors in the fabric, then sends electrical signals to elicit targeted muscle contractions in the legs.

—Jeremy Gantz



SUSTAINABILITY

Undersea AI

Tidal

"The ocean is the most misunderstood and mismanaged resource we have," says Neil Davé, general manager for Tidal, Alphabet's (yes, Google's parent company) moon-shot project to protect the seas. Tidal's first commercial product is an underwater AI camera that gathers insights for salmon farmers, with the goal of promoting more-sustainable practices. The technology can spot evidence of sea-lice infestations early for less invasive interventions, and help reduce waste by tracking exactly how much food the fish need. Mowi, the world's largest salmon farmer, this year installed 230 of the systems across Norway.

—Jessica Hullinger

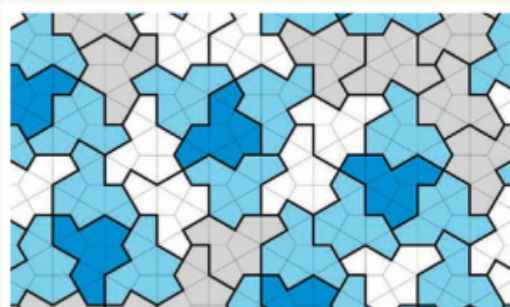


CONSUMER ELECTRONICS

A modern flip phone

Samsung Galaxy Z Flip5

Cell phones are addictive by design, but sometimes you just want to check an email without getting sucked into apps. The Samsung Galaxy Z Flip5's key feature, its Flex Window, fixes that. The flip phone has a 3.4-in. external screen, next to its back-facing lenses, that allows you to dip into important notifications without being lured in. The Flex Window is also customizable: Peter Park, senior manager for product in Samsung's smartphone division, has Spider-Man wallpaper on his. ("You know, with my name and whatnot," he says.) Flip it open for a full 6.7-in. display. —C.S.W.



DESIGN

A long-sought solution

The einstein shape

Unless you're renovating a bathroom, you may not think a lot about tiles. But mathematicians do. One of their long-standing quests has been to design a tile shape that can cover a plane of infinite size without repeating the pattern with which the tiles fit together. Formally an aperiodic monotile, it's also called an einstein—from the German for "one" and "stone." Last November, David Smith, a retired printing technician in Yorkshire, England, hit einsteinian pay dirt by creating this 13-sided shape. Did the world need an aperiodic monotile? No. Are we a little smarter now that one exists? Absolutely. —Jeffrey Kluger

TRANSPORTATION

Autonomous ferry

Callboats CAT 10-L

Up to 70% of the cost of maintaining a passenger-boat fleet comes from paying captains. In the interest of economics and sustainability, the Finland-based Callboats has developed the world's first AI-powered autonomous boat, which is all-electric and partly charged by solar energy. Pending regulatory approval, the 30-passenger 10-L water taxi will run between Helsinki and a nearby archipelago with only one crew member on board (just in case anything goes awry). Users will be able to hail the vehicle, which can reach a top speed of 12 knots (nearly 14 m.p.h.), via a mobile app. —C.S.W.



FOR WHAT AILS YOU

Pharmaceutical companies had a big year in 2023. Among their innovations are novel solutions that promise to save lives. **GSK's Arexvy**, for instance, is the first vaccine for RSV, a respiratory illness especially dangerous to babies and older adults.

Others, while ground-breaking, were not immune to controversy. **Novo-Nordisk semaglutides Ozempic and Wegovy** are effective treatments for weight loss and diabetes, but this year triggered concerns about significant side effects and the high cost.

In hospitals, the **Targeted Real-Time Early Warning System** uses AI to detect signs of sepsis.

Several new products address maternal health problems. The **Thermo Fisher Scientific preeclampsia blood tests** can now identify women at risk of the pregnancy-complicating illness. And **Sage Therapeutics and Biogen's Zuruvae** became the first FDA-approved oral treatment for postpartum depression, a designation that alone could increase screening and diagnosis of the condition.

Some new drugs fell short of cures but are important steps

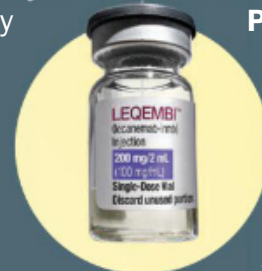
forward. **Eisai and Biogen's Leqembi**, the second drug approved for treating the underlying causes of Alzheimer's, has been shown to reduce cognitive decline by 27% vs. placebo.

Provention Bio Tzield, meanwhile, is the first drug to treat the underlying cause of

Type 1 diabetes, and may delay onset of the disease. Cosmetically, medicine hasn't yet beaten aging, but **Revance Therapeutics' new Daxxify** was found to last longer than

Botox at reducing wrinkles. New devices also aim to improve patients' quality of life.

The **Abbott Avelr DR Dual Chamber Leadless Pacemaker System** is the first that works in both chambers of the heart but doesn't need a lead (external wires), sparing patients discomfort. The **Micro-Transponder Vivistim Paired VNS System** for chronic ischemic stroke survivors can improve hand and arm function when paired with therapy. And the **Luminopia** is a VR headset that offers a fun and less stigmatizing alternative to eye patches for lazy eye. —Tara Law



FIXING SHIPPING

New innovations are trying to address the inefficiencies that back up the supply chain and contributed to global inflation of 8.7% last year.

At the warehouse stage, the **ArcBest Vaux** system uses wheeled platforms and AI-powered software that smartly moves freight off trucks.

Robots like the **Sanctuary AI Phoenix**, which does small workplace tasks, and **Simbe Tally 3.0**, which scans shelves for inventory, reduce workload on humans (and are often more reliable).

Other tools track goods throughout the supply chain. The **Ember Cube** is a cold-shipping box that delivers real-time temperature and humidity data for medical shipments. The battery-free **Oppo Zero-Power Tag** transmits location and other data, powered only by ambient heat and radio waves. And the **Willot IoT Pixel** transmits carbon-emissions data at each stop a product makes.

Meanwhile, **Laura Maersk**, the first green-methanol-powered container ship, aims to reduce the carbon footprint of ocean shipping.

—Tara Law

FITNESS

Strength with less pain

Katalyst

Plenty of people, from athletes to those with busy lives or past injuries, would like the benefits of a two-hour workout in just 20 minutes without excess strain on their joints. That's the promise of Katalyst's four-piece bodysuit, the only FDA-approved consumer device to use full-body electrical muscle stimulation, or e-stim. When you use Katalyst for a strength session, strategically placed pads gently zap your muscles with electricity, which founder and CEO Bjoern Woltermann says activates double the number of muscle fibers that standard training does. Sessions, he says, will leave you tired. —Ashley Mateo



PARENTING

Kid's best friend

WowWee Dog-E

For a pet without the expense or time commitment, the new WowWee Dog-E is a remarkably smart and customizable robot canine. Each bot has unique features, such as eye color and shape, and even personality traits and preferences, and the app-compatible pet responds to your interactions and remembers them, building memories and learning new tricks—all without the need for early-morning walks. Still, prepare to become attached. "You love your [actual] dog for its unique, quirky personality," says Andrew Yanofsky, vice president of marketing and operations at WowWee. "And our dogs are one in a million." —C.S.W.



CONSUMER ELECTRONICS

A small-space racer

Logitech Playseat Challenge X

Gamers using sophisticated race-car simulators have traditionally had two options when picking a steering wheel and pedal setup for their home: go cheap but lose realism, or buy an expensive, high-end chair that takes up a lot of space. The new Playseat Challenge X—Sim Racing Seat, Logitech G Edition finally finds a middle ground. At \$299, the 26-lb. carbon-steel frame is a snap to assemble and folds down for easy storage. But it also accurately mimics life in the fast lane, with six seating positions depending on your driving style. —Chris Stokel-Walker

FITNESS

A flexible foundation

Stakt Mat

Like so many, Millie Blumka and Taylor Borenstein began working out at home during the pandemic—and quickly found the yoga mats they had on hand weren't versatile enough for other forms of exercise. So they created the Stakt Mat, which is twice as thick as the average yoga mat, at 12 mm when flat. The 3-lb., double-sided EVA-foam mat is foldable along five panels. Fold it all the way up to make a yoga block or raised surface for incline exercises and lunges; flip a panel or two down for extra elbow cushioning during planks. —Katie MacBride



AI

Listen up

Project Gutenberg Open Audiobook Collection

Project Gutenberg is the oldest digital library, started in 1971 to make e-books more accessible. But CEO Greg Newby says it "isn't great at either creating or distributing." So Microsoft and MIT teamed up to make the Open Audiobook Collection, using text-to-speech tech to turn 5,000 books into free, synthetically narrated audiobooks, now available on Spotify. The software fueling the project was also released at no charge. —C.S.W.



CONSUMER ELECTRONICS

Fresh tricks

Apple Watch Ultra 2

Apple's new Ultra 2, its highest-end watch, allows you to simply tap your index finger and thumb together twice to answer the phone or snooze an alarm. This cool trick is enabled in part by an algorithm that detects tiny changes in blood flow when you tap those fingers. In addition, it's among Apple's first carbon-neutral products. Apple says 30% of the material is recycled, while many units are shipped from factories by sea instead of by air. Apple plans to eventually take the same approach with all its products. "We will keep innovating to meet the urgency of the moment," says Lisa P. Jackson, vice president of environment, policy, and social initiatives.

—Pranav Dixit

CONSUMER ELECTRONICS

Easier fixes

Nokia G22

Last year, about 5.3 billion mobile phones fell into disuse. This waste has led to a push for tech that can be fixed more easily rather than replaced. Nokia's G22 is the latest, most advanced phone to be fully repairable. Anyone with a small screwdriver and five minutes can replace its screen, charging port, or battery—the parts that most often break, says Lars Silberbauer, chief marketing officer at manufacturer HMD Global—keeping it off the scrap heap.

—Don Steinberg

AR & VR

Doctor's aid

Medivis SurgicalAR

Surgeons frequently must pivot from looking at a patient's data on a screen or clipboard to looking at the patient. That's changing with the SurgicalAR platform. Now, a surgeon can wear an AR headset that superimposes data on a patient's body during an operation, creating a visual guidance system that can assist with complicated procedures like brain-tumor removal, and reduce errors. It's already in action at hospitals like Houston's MD Anderson Cancer Center. —Jeff Wilser



FITNESS

Hydration made fun

Owala FreeSip

A water bottle must be something special to merit a hashtag (#owala) that's been viewed 272 million times on TikTok—not to mention a resale value of roughly \$400 for limited editions.

Trove Brands' stainless-steel Owala FreeSip is leakproof and offers two drinking methods—a straw and a larger opening for guzzling that conforms to the shape of the user's mouth. A variety of color palettes with fun names like Shy Marshmallow have helped the bottles go viral. "We took boring," says inventor Steve Sorensen, co-founder and CEO of Trove Brands, "and added a little magic." —Jessica Klein

DESIGN

Audiophile style

Teenage Engineering TP-7

Digital audio recorders are plentiful, but few look—or feel—like the TP-7 from

Swedish company Teenage Engineering. "A main theme when we develop products is to rethink what a tool is," says CEO and head of design Jesper Kouthoofd. "We felt [an audio recorder] could be done in a more creative way." The palm-size device records podcast-quality

audio and features three chunky buttons akin to those on a 1970s hi-fi system. A side-mounted "rocker" scrubs through tracks. Another retro touch: as the TP-7 records and plays back, a motorized "tape reel" in the center of the gadget actually rotates. —C.S.W.



EVEN MORE INVENTIONS

▶ The **Hewlett-Packard Enterprise Frontier** is the world's most powerful supercomputer.

▶ **Spotify DJ** uses AI to create your perfect playlist, with commentary from an AI-generated DJ.

▶ **Goodbill** analyzes and negotiates hospital bills to save patients money.

▶ **PitchCom** is an encrypted device that lets baseball pitchers and catchers covertly call pitches.

▶ The **Kia EV6 GT** gives drivers high-end EV performance at an affordable price.

▶ **Tended Wearables** use geofencing to precisely alert workers of nearby dangers on jobsites.

▶ **Super-salt-resisting solar-still technology**, developed at MIT, is the first to create drinking water from salt water cheaply, using only solar power.

▶ The **Navtek Naval Technologies Zeetug** is the first all-electric tugboat.

▶ **Dedrone City-Wide Drone Detection** uses sensors and AI to track unauthorized drones.

▶ **Row 7 Seed Company Sweet Garleek** is a delicious leek-garlic hybrid, in grocery stores now. —T.L.

FOOD & DRINK

Next-gen avocado

Luna UCR

The Luna UCR is one very special avocado. The result of a decades-long breeding program at the University of California, Riverside, it has a flavor similar to that of its popular relative, the Hass, but a bit more “floral,” says program horticulturist Mary Lu Arpaia. The Luna UCR is ripe as soon as its skin turns black—which takes the guesswork out of slicing in—and it stays fresh long enough to transport. Luna UCR trees are as bountiful as Hass trees, but smaller, meaning they’re easier to harvest and require less land—and potentially less water and electricity. It’ll take a few years before they hit grocery stores. —Tara Law



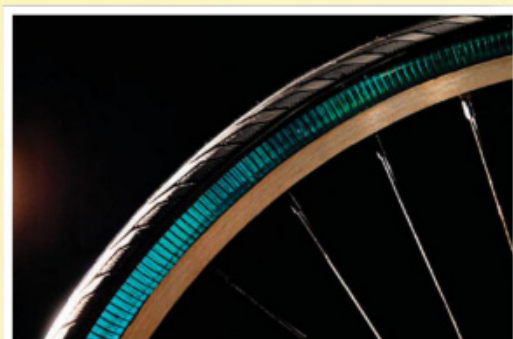
AI

Picturing your imagination

OpenAI DALL-E 3

When OpenAI unleashed ChatGPT on the world in November, it radically changed the AI landscape. The company hopes DALL-E 3—the new and vastly improved version of its AI image generator—will have the same impact. Previous image generators, says OpenAI’s Aditya Ramesh, the inventor of DALL-E 3, require learning a new technical language, including appending strings with minuses and numbers, to get the best results. Not so with DALL-E 3, which folds into ChatGPT so users can enter conversational commands and get an image that matches their description.

—Chris Stokel-Walker



TRANSPORTATION

An airless wheel

SMART Tire

At a 2020 NASA program for entrepreneurs, Earl Cole and Brian Yennie learned about an unusual metal alloy called nitinol, which the agency used to build airless wheels tough enough to roll over the rocky surfaces of the moon or Mars. Intrigued, Cole, now CEO of the SMART Tire Co., and Yennie, its CTO, developed an airless bicycle wheel made from a spiral largely made of nitinol. The tire, set to ship next year, will never go flat, and “actually could last the life of your vehicle,” says Cole, if you replace the cheap rubber tread on the exterior as it wears down. —T.L.

EXPERIMENTAL

Electric speed

Academic Motorsports Club Zurich Mythen

Electric vehicles are good for the planet, but they’re not known for being good on the racetrack. The Mythen could change that. Thirty students and alumni of the Academic Motorsports Club Zurich at ETH Zurich university set out to make the first racing EV that can go from 0 to 100 km/h in less than a second, and in September, at a race in Dübendorf, Switzerland, the Mythen did just that—in 0.956 seconds. The team took a year to engineer the 309-lb. car, using a vacuum fan that hugs the vehicle to the tarmac, significantly reducing drag. —C.S.W.



BETTER MATERIALS

As humanity works to build a future that avoids the worst effects of climate change, the materials we use are taking center stage. Manufacturing and construction are two of the most harmful human activities: the cement industry alone is responsible for 8% of man-made carbon emissions. But creative minds are proposing clever new solutions to build cleaner.

One leader in the cement industry is **Brimstone**, whose **carbon-negative cement**

replaces limestone with calcium silicate rock. It became the first in the industry to receive third-party certification that its product is as strong as standard cement.

Others are working to replace or reuse plastic. **UBQ**, for instance, is a biologically based thermoplastic made of organic and unrecyclable waste.

MicroPET is a system that uses specially engineered bacteria to convert single-use plastic into nylon. And **Choose Planet A’s The Good Cup** is a paper cup that replaces sealants with a water-based glue, making it leak-proof, easier to recycle, and biodegradable.

The cups also fold closed, eliminating the need for plastic lids.

Other innovations aim to limit the environmental impact of mining metals needed for green energy. **Niron’s**

Clean Earth Magnet

is made from plentiful iron and nitrogen, which is stronger and eliminates the need

for rare-earth magnets. **Li-Metal’s**

lithium-production process makes the metal widely used in batteries more sustainably by dissolving lithium carbonate in molten salt.

Some companies are working to make supply chains more traceable, to ensure goods are produced ethically. **FibreTrace** embeds a luminescent pigment in fiber, which makes the final garment scannable to verify its origins.

And to increase energy efficiency, scientists have taken on the question of how to better insulate homes and cars. At **Purdue University**, the answer is **whiter paint**, which is composed of chemicals that better scatter UV rays and, when used on exteriors, can reduce the need to cool buildings and cars by reflecting more heat than ordinary white paint. —T.L.



OUTDOORS

Walk the city

Shift Robotics
Moonwalkers

These battery-powered wheeled shoes allow you to walk normally (not skate), just faster and more easily. The Moonwalkers use AI to sense when you're speeding up or slowing down and adjust themselves accordingly, and the wheels lock when you're taking the stairs. Tested in Pittsburgh, Baltimore, New York City, and Washington, D.C., the shoes allow you to walk at speeds up to 7 m.p.h.—250% faster than your average gait—so you can travel farther without tiring out. —Pranav Dixit



OUTDOORS

Nature views

OnX Recent Imagery

When planning a hunt or a backcountry hike, knowing the latest on-the-ground conditions—like whether a cornfield has been harvested or a mountain pass is dry—is invaluable. OnX, which makes apps geared to hunters, off-roaders, and other backcountry adventurers, this year added a “recent imagery” feature, which provides paying users (in every U.S. state but Hawaii) unparalleled visibility thanks to satellite images provided by Planet Labs. The cloud-free imagery—twice as detailed as that of competing apps, OnX’s Brian Riordan says—is updated every two weeks. —Jeremy Gantz

APPS & SOFTWARE

Safer period tracking

Flo Anonymous Mode

When the U.S. Supreme Court overturned the right to abortion access in June 2022, fears arose that legislators might leverage companies’ data to track women’s reproductive health. So that September, period-tracking app Flo put out a new option called Anonymous Mode, which can “completely decouple health information from the identity of the user,” according to chief technology officer Roman Bugaev. The constantly updated service, available to Flo subscribers at no extra charge, was developed with web-infrastructure company Cloudflare. Earlier this year, Flo released an open-source version. —Haley Weiss

ACCESSIBILITY

Gaming for all

Sony Access
Controller for PS5

More than a third of the world plays video games, but participation remains a challenge for the 16%

of the population living with a significant disability. Enter PlayStation’s Access Controller, a customizable kit that features a joystick along with 22 swappable components that can be configured into various layouts and combined with other accessories to meet

different physical needs. Sony Entertainment’s senior vice president of platform experience, Hideaki Nishino, says the PlayStation 5-compatible device’s creation involved five years of research and development alongside accessibility experts.

—Jared Lindzon



CHINA WATCH

PRESENTED BY CHINA DAILY 中國日報

BY WANG RU and ZHU LIXIN

Zhou Donghong, 56, holds a finely woven bamboo screen with his partner. They steep it in a large trough full of pulp and lift it. A piece of moist Xuan paper takes form on the screen, known as a "mold and deckle" in the West. Then they carefully separate the freshly formed sheet of paper from the screen, spreading it flat out without any creases.

The process, called *laozhi* (getting paper out of water) lasts only a dozen seconds, but the adeptness comes from Zhou's experience of doing it repeatedly for 40 years.

This is one of the most important steps in making Xuan paper, a traditional handmade paper in China. The paper, made in Jingxian county, Xuancheng, Anhui province, is the product of a mixture of sandalwood bark, rice straw and stream water from the mountains.

Papermaking is the crystallization of wisdom of ancient Chinese people, regarded as one of the four great inventions of China, with gunpowder, the compass and printing techniques. Among various types of handmade paper in China, Xuan paper is famous for its close links to traditional calligraphy and ink paintings.

The traditional handicrafts of making Xuan paper were inscribed on the Representative List of the Intangible Cultural Heritage of Humanity by UNESCO in 2009.

Although *laozhi* seems simple, it is the most difficult step in making Xuan paper, with demanding technical details.

"The process of paper forming



Getting the paper out of water.



Drying and smoothing out the paper.



Checking the quality and cutting the sheets.



Checking printed paper pages.

A cultural paper trail

Traditional craft survives and thrives despite challenges



Checking the quality of each sheet is one of the 108 procedures in making Xuan paper.

PHOTOS BY ZHU LIXIN / CHINA DAILY

is the most difficult because I have to transform something intangible into something tangible, which means I need to scoop it out from the pulp and turn it into a sheet of paper," Zhou says. "The thickness, uniformity and weight of this sheet are all controlled by my hands. In some way my hands are just like a scale."

The skill can be mastered only through long hours and painstaking practice. Zhou says that he started learning the craft as an apprentice in 1985.

In 1986 he became an employee of a Xuan paper factory in

Jingxian, which is today's China Xuan Paper Co., Ltd. After finding a good teacher, and years of practice, he has honed his skills to the extent that 99% of the paper he makes meets the standard.

In 1993 Zhou was given the task of restoring *zhahua*, an ancient type of Xuan paper renowned for being incredibly light and "just as thin as cicada wings". One hundred sheets of *zhahua* weigh just 3.1 pounds, less than half of the weight of ordinary Xuan paper. Zhou did a lot of reading and experimentation, adjusting the concentration



Foldable fans are popular products made by China Xuan Paper Co., Ltd. PROVIDED TO CHINA DAILY

Old treasure's fineries on display

BY XING WEN and ZHU LIXIN

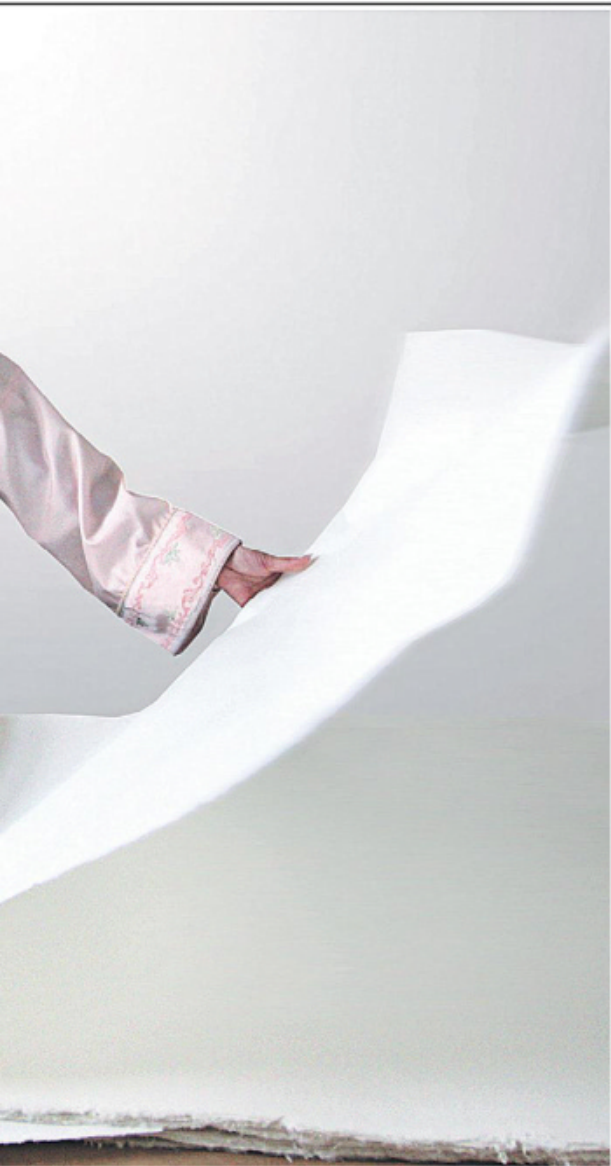
Amid the spectacle of the Olympic Games opening ceremony in Beijing in August 2008 the colossal screen in the Bird's Nest stadium displayed the process of creating a traditional Chinese painting, from the making of Xuan paper and the delicate brushwork applied to its surface, to the art of mounting the finished masterpiece on a scroll.

The short film not only showcased the allure of China's "four treasures of the study", namely Xuan paper, brushes, ink and ink slabs, but also conveyed the serenity of classical Chinese art.

Clad in pristine white robes, craftspeople skillfully executed the steps involved in making Xuan paper, an exquisite and enduring material closely associated with Chinese calligraphy and paintings.

The age-old craft continues to be faithfully practiced by a dedicated group of craftspeople in Jingxian county, Xuancheng, Anhui province. The enduring tradition has not only made the county one of the country's leading hubs for handmade paper, but has also breathed new life into its culture and tourism sectors.

Nestled at the base of emerald hills in Jingxian is a white struc-



of paper pulp and the intensity of his movements, and he finally managed to re-create the paper.

Making Xuan paper is extremely demanding, and it takes nearly three years to produce a batch of it through 108 procedures. An artisan can only skillfully master some of them over a lifetime.

For example, although Zhou, a master of *laozhi*, knows all the other procedures, he specializes in that one area and the procedures it entails, because each requires long-term practice to attain the necessary level of skill. As a result, the whole papermaking process



Among various types of handmade paper in China, Xuan paper is famous for its close links to traditional calligraphy and ink paintings. PHOTOS PROVIDED TO CHINA DAILY

requires a lot of collaboration.

Five people form a group, two for *laozhi*, two for *shaizhi* (drying paper) and one for *jianzhi* (checking quality of and cutting paper). Work results of the whole group are evaluated together. "There are high demands for the appearance, evenness and weight of the finished products," Zhou says. "The weight of one piece of Xuan paper has only a 0.035-ounce margin of error. Paper that is not up to scratch is sent back for reproduction, and we're not paid for it.

"It's all about group spirit, tacit understanding and mutual trust."

The earliest record of Xuan paper can be found in *On Famous Paintings Through the Ages*, a book written by the Tang Dynasty (618-907) scholar Zhang Yanyuan, in which he described Xuan paper's function as being a carrier of calligraphy and painting.

Huang Feisong, director of the Xuan Paper Research Center at China Xuan Paper Co., Ltd., says that based on clues in the historical record, Xuan paper was named after its main production area, Xuancheng.

"Xuan paper has many characteristics, such as the ability to show different shades of ink, its stability, its durability and its resistance to insects, of which the first is the most prominent, and that's why it has been the favorite of calligraphers and painters through the ages.

"The other features ensure it can be kept for ages, and that enables paintings, calligraphy, ancient documents and books

to be passed down to the present day."

Li Xiaolong, a Chinese ink painter, says that when one creates freehand brush paintings, showing ink variations is important. Some painters drip or splash ink like raindrops, and Xuan paper is the best for showing what they want to present.

"Xuan paper and artists are just like fish and water, which means they need each other. Xuan paper can show its quality through the creation of calligraphers and painters, and artists cannot give full play to their talent without Xuan paper."

Tang Shukun, director of the Handmade Paper Institute at the University of Science and Technology of China in Hefei, Anhui, says calligraphy and ink paintings, especially freehand brushwork created on Xuan paper, have their unique appeal. As early as the Tang Dynasty Xuan paper was listed as a tribute to the imperial court.

As Chinese calligraphy and paintings developed, so did Xuan paper, Tang says.

Jingxian became an important place for papermaking during the Ming Dynasty (1368-1644), Huang says.

The Xuan paper industry has grown steadily in Jingxian. Last year about 551 short tons of Xuan paper were produced in the county, and more than 30,000 locals are engaged in the industry.



Online
Watch the video by scanning the code.

ture that resembles a stack of gracefully arranged paper.

This is the Xuan Paper Museum, dedicated to the history and craft of Xuan paper production that displays masterpieces of traditional calligraphy and painting.

The museum is part of Xuan Paper Cultural Park, constructed by China Xuan Paper Co., Ltd. People can visit workshops to experience the traditional way Xuan paper is made.

Apart from producing paper in a variety of sizes, China Xuan Paper Co., Ltd. also makes cul-

tural and creative products made from the paper, such as foldable lanterns shaped like books and paper umbrellas. Huang Yingfu, deputy chief manager of the company, said it is also expanding the use of Xuan paper in areas such as stamp production, book printing and as paper used for restoring cultural artifacts.

In the contemporary art world the age-old, humble material also remains a source of vitality and inspiration, inspiring artists to create unconventional installations.

Among the exhibits of the

Chengdu Biennale 2023, Zhu Jinshi's pillar-like installation, which stands 39 feet tall and is 11 feet in diameter, is made using an internal steel frame covered with Xuan paper. He has named the piece Du Fu Tower, in tribute to the Tang Dynasty (618-907) poet Du Fu.

Zhu's exploration of the use of Xuan paper in art installations dates back to 1988. Explaining why he has been using the paper for so long, he says that his installations are the product of challenging traditional forms of calligraphy and painting on Xuan paper.



From top: An art installation covered with Xuan paper by Zhu Jinshi. Xuan paper is used in book printing. PHOTOS PROVIDED TO CHINA DAILY



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Cailee Spaeny on the set of *Priscilla*, from Sofia Coppola's *Archive* (2023), published by MACK

MORE THAN A TEENAGE DREAM

BY STEPHANIE ZACHAREK

With the quietly extraordinary *Priscilla*, Sofia Coppola mines the inner life of the girl who fell for Elvis Presley

INSIDE

TAYLOR SWIFT BRINGS HER ERAS TOUR TO THE BIG SCREEN

HOW 2023 BECAME ONE BIG COSTUME PARTY

HAVE YOU EVER HAD AN INTENSE EXPERIENCE—fallen madly in love, say—only to look back years later and feel it had happened to a different person, a person who had walked through a dream, and survived it, to get to the self you were destined to become? That’s the feeling Sofia Coppola captures in her quietly extraordinary *Priscilla*, which is adapted from the story told by Priscilla Presley in her candid and moving 1985 memoir *Elvis and Me*. Maybe we all have to survive our teenage dreams; the things we want at age 14 are rarely the best for the long term, and luckily, most of us don’t get them. But the teenage Priscilla Presley got what she yearned for. *Priscilla* invites us to walk side by side with her, but not so we can ultimately be punished by the fallacy of her dream; rather, this is a story about deep, cavern-like loneliness, and how one person’s responding to the loneliness of another can be both an adventure and a destiny. So much of being a teenage girl is just waiting for your chance to *be*; this is the story of one who refused to wait.

Cailee Spaeny plays the 14-year-old Priscilla, an Air Force kid living in 1959 Wiesbaden, West Germany, with her siblings and parents—her dad is a captain. Coppola captures young Priscilla’s ennui—and her seraphic, unassuming beauty—as she sits at an air-base snack bar, the moony strains of Frankie Avalon’s “Venus,” a song about wanting the unattainable, swirling around her. (It’s a starry-eyed cover by the band Phoenix.) A good-looking older guy asks her if she likes Elvis Presley. Would she like to meet him? It seems creepy. Priscilla is sure her protective parents won’t let her go.

But the guy meets with her father and persuades him all will be OK. Priscilla has no idea what to wear, what will be the most pleasing and grownup—she can’t wear her *Easter* dress! she moans to her mother—and is whisked off in the car Elvis has sent for her. When she arrives at his house, he’s rollicking at the piano, surrounded by admiring young women—as opposed to teenage girls. He’s not just a teen fantasy; he’s a man, 24 years old. Eventually, he makes his way over to this shy but self-possessed young person and asks if she’s a junior or senior in high school. When he finds out she’s in the ninth grade, he laughs, and says, “You’re just a bay-buh,” the last syllable just a ghost of a sound, a little bit of Tennessee he carries with him always. “Thanks,” she says dryly, clearly insulted, as any self-respecting 14-year-old girl would be. He laughs again.

Elvis, played by Jacob Elordi (of the *Kissing Booth* movies and also Emerald Fennell’s upcoming *Saltdorn*), likes this girl, and he feels he can talk to her. Her parents are persuaded to let her visit him again, and again. He tells her how much he misses his mother, who’d died not even a year earlier. He is just so deeply lonely—and this isn’t a come-on, it’s the truth. She listens not just with sympathy, but with something much deeper, a pure eagerness to let this strange, sad man—who just happens to be outrageously famous—fill her with his bounteous woe. She can carry as much as he can pour into her; she’s that strong. She’s not a bay-buh.

Coppola carries us through both the early, secret-garden bliss of this love story and the darker tunnels of confusion that later spring up in Priscilla’s path. Her trademark quick-shot montages—an extreme closeup of a kitty-cat eyeliner swoop, a pair of stilettos adorned with daisies, a can of Aqua Net hair spray—roll back time to a mid-1960s girly world, where the right makeup and accoutrements could mean the difference between an eternity of married joy and a prison of old-maidhood. Shot by Philippe Le Sourd, often in deep, secretive tones, the movie is so intimate, it seems to take place inside a seashell, with both the coziness and the claustrophobia that implies.

AND COPPOLA’S USE of the anachronistic pop song is nonpareil: after Elvis bestows his first, gentle kiss on Priscilla’s lips, she enters a fugue state, having shifted to new plane of existence. At that point, it’s Tommy James and the Shondells’ “Crimson & Clover” that cocoons around her like a whisper, a song from the future, a haunting in advance. (It wouldn’t be released until 1968, the year after Elvis and Priscilla’s marriage.) Elvis is so tender with his very young love—until he’s not. After he has been discharged from the service and goes back to the States, he starts making movies again, often embarking on romances with his co-stars, the clearly irresistible Ann-Margret among them. Priscilla, still in Germany, picks up on her almost-beau’s broken promises by reading the newspapers. Coppola shows her paging through them, feeling adrift—Elvis had made her feel necessary, indisposable, adult. Now she was a kid again. He doesn’t call her—and then he does, out of the blue. First she’s visiting him at Graceland, his swanky, idiosyncratically decorated Memphis mansion. Later, he’ll persuade her parents, with his well-mannered Southern charm and the sense of duty his mother Gladys had instilled in him, to allow her to move into his palace fortress and finish out high school nearby. Amazingly, they allow it.

But Elvis’ love comes entwined with a need to control. When he takes



Elordi and Spaeny: before coziness turns claustrophobic



OPENING PAGE: SOFIA COPPOLA, FROM ARCHIVE (MACK, 2023). COURTESY OF THE ARTIST AND MACK; THIS PAGE: KEN WORNER—A24

Priscilla shopping—his entourage of joshing guy friends always in tow—he wants to reshape her. She steps out in a dazzling golden leafy-brocade gown—the radiance of her face signals that she loves it—but he waves it away, telling her prints don’t suit her. He urges her to dye her hair black, tells her heavy makeup will bring out her eyes, a lie of the devil told by a man who knows no better. He wants her, it seems, to look more like himself, as if he were seeking a missing half—perhaps that’s an all-too-obvious metaphor for Elvis’ twin Jesse Aaron, who died at birth, but there you have it.

It gets worse: A fan of pills of all kinds, he gives her something to sleep that ends up knocking her out for two days. He flies into a rage during a pillow fight, hitting her accidentally, or perhaps not, in the face. He wants their union to be chaste until marriage; and then, after their consummation results in a child, Lisa Marie, he refuses to touch her.

IT ALL SOUNDS HORRIBLE, and it is. But Coppola makes it clear, as *Elvis and Me* does, that nestled within the darkness of this union was an

incomparable tenderness, something Priscilla Presley could never get over. We see an early kiss between them, Elvis’ slightly open mouth just brushing hers. That’s how levitation is achieved, when you’re young and in love. Elordi makes a fine Elvis, though a very different one from the flashy performer Austin Butler gave us last year, in Baz Luhrmann’s crazy-marvelous *Elvis*. This is the private Elvis, and Elordi plays him as a man who floats further and further away from the woman he loves, like an astronaut whose tether has been cut, even though he yearns for closeness and connection. He’s not a bad guy; he’s just a mess. And in this story, he’s just an accessory to the heroine. It’s not his story.

Spaeny gives such an intimate, lived-in performance that some viewers may not think it’s enough. That’s because she’s playing Priscilla as an observer, a young woman who

**So much of being
a teenage girl is
just waiting for your
chance to be**

gradually sees what’s wrong with her life and her screwed-up partner, but who, by the movie’s end, can barely reckon with what’s happened to her over the past dozen years. And if you were in her satin stilettos, could you? Spaeny’s Priscilla, openhearted yet wary, compliant yet cautious, is a young woman in navigation mode, the subject of many of Coppola’s movies (*The Virgin Suicides*, *Marie Antoinette*, *Lost in Translation*). She’s not demonstrating anything for us; she’s merely allowing us to travel with her.

In the epilogue to her memoir—which was co-written by Sandra Harmon—Presley noted with dismay that so many books about her late ex-husband had focused on his temper tantrums, his drug abuse, his various eccentricities. “I wanted to write about love and precious, wonderful moments and ones filled with grief and disappointments, about a man’s triumphs and defeats, much of it with a child-woman at his side, feeling and experiencing his pain and joys as if they were one.”

Presley’s memoir is based on facts, events, and her own experience. But *Priscilla* is a story told from within that experience—there’s no false knowingness about how bad things are going to get, no sense of portent, no “Of course, she should have known better than to trust a guy like that” assessment of the way young Priscilla Beaulieu fell so crazily, sweetly in love. Instead, Coppola draws us into the immediacy of her desires, the way her friendship turned romance with one extremely lonely man represented, for a time, everything she wanted out of life. Somehow, even though we know how tragically the story turns out, we want that for her too. A child-woman is a future unto herself; Priscilla’s future just came earlier than most, swept in by a man who truly loved her, inasmuch as he knew how to love. Coppola’s movie ends almost abruptly—it feels a little wrong, until you realize that it’s the only possible ending. You ask yourself, *What did I just see? What just happened?* Because you’re waking up just as Priscilla Beaulieu Presley is, having walked with her through her dream of becoming. □

REVIEW

The Eras Tour will make anyone a believer

BY STEPHANIE ZACHAREK

SINCE HUMANKIND HAS BEEN WALKING upright, and maybe even when we still had fins for arms, we've been attracted to shiny, shimmering things. In concert, Taylor Swift is exactly that. Tickets for the Eras Tour, Swift's first concert tour in five years—set to conclude in November 2024—were costly and difficult to get, which meant you had to either be very lucky or fall within a certain income bracket to participate. But the spirit of the Eras Tour is now available to almost everyone in the form of a concert film, one that is perhaps unsurprisingly exuberant and delightful. *Taylor Swift: The Eras Tour* is 2 hr. 48 min. of an irresistibly shiny, shimmering Taylor Swift. She's the lure skimming through the water; we're the gawping trout, dazzled to the point of transcendence. All that for less than 20 bucks.

We are trout, it seems, of many different shapes, sizes, ages, and orientations (even if, statistically, three-quarters of us are white). I saw the film on what was supposed to have been its opening night, although in one of Swift's trademark last-minute moves, she launched the film early. (Swift, who self-produced the film, is distributing it in partnership with AMC.) My enthusiastic audience was about one-third young women, one-third little girls in sparkly attire (accompanied by their parents), and one-third gay men. One of the men handed me an elastic circlet strung with turquoise and smoke gray plastic beads, apologizing for its tiny circumference—one of the small Swifties had given it to him—though it fit me just fine. “Now you can be part of the experience,” he told me. Plenty of people could resist, but it turns out that I—really only a moderate Swift fan—am not one of them.

The Eras Tour is a cleverly if somewhat haphazardly stitched-together approximation of an Eras Tour live show. (The director is Sam Wrench, and the footage was captured at SoFi Stadium outside Los Angeles.) Some of the cutting may be reckless; there's the occasional WTF? camera angle. But Swift's command of her audience—and of the moment—is so complete that she instantaneously airbrushes every questionable filmmaking decision

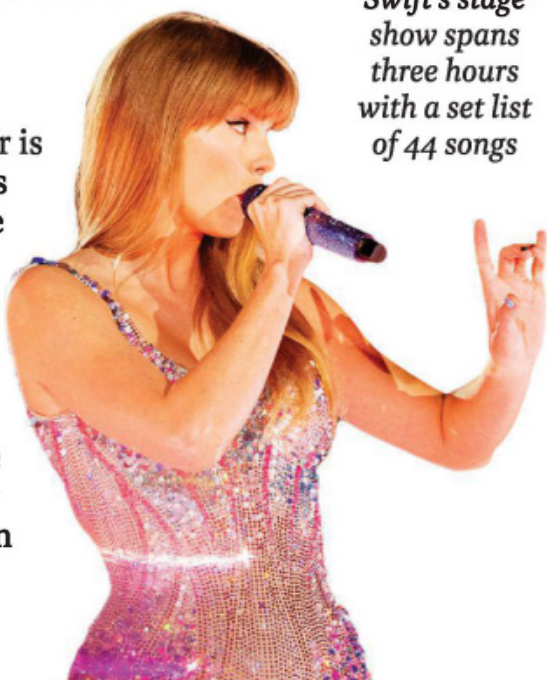


into oblivion. The Eras Tour is so named because it hopscoches through Swift's nearly 20-year career. You could make a gaudy, jumbled show from that wealth of material, or a grand one, and Swift has done the latter. Every number is like a room in a sprawling mansion, executed in just the right tone and color.

And so, when Swift takes the stage for the show's first round of numbers—among them “Cruel Summer”—she does so in a spangly, pale lavender tank suit with over-the-knee high-heeled Louboutin boots to match, their soles as red as a cartoon devil. It's a highly impractical outfit, but on Swift it looks normal, even low-key. When she segues into the *Fearless* era, she steps out in a minidress of golden fringe, once again with boots to match, only these are a bit more grounded—Swift, wisely, knows how important it is to switch between heels and flats. For “Ready for It...,” off *Reputation*, she slinks out in a one-legged black catsuit, shiny snakes slinking around her limbs. For “Willow,” off the smoky-forest LP *Evermore*, Swift emerges from a projected backdrop of spooky trees, wearing a velvety black hooded cape over a flame orange dress. Her cloak-clad dancers close in protectively around her, bearing glowing orange orbs. Swift can be anyone she wants to be: a heroine from the cover of a gothic-romance paperback, sensibly fleeing a foreboding castle; a drum majorette sans baton, but with a mic instead, and plenty to say.

Victim, survivor, temptress, storyteller by the fire: Swift gives herself permission to be the woman she wants to be at any given moment, which may be why so many little girls are drawn to her before they have any real sense of what womanhood is. Well, that and the

Swift's stage show spans three hours with a set list of 44 songs



< The Eras Tour will hit five continents, with 146 dates

sequins. There's no easy way to break down Swift's appeal. The veteran rock critic Ann Powers has made a convincing case for her similarities to Bob Dylan, in the sense of building her own shape-shifting world. "In a patriarchal society that favors white men, how can a young woman who looks like a supermodel dare to think she could be historical? And yet she does," Powers has said.

The *Eras Tour* movie shows, to stark effect, Swift's power over an arena full of people. Gazing out at this massive audience, she's like the *Romper Room* lady with her magic mirror—is it possible she knows each and every one of our names? With her kitty-cat smile and Cleopatra eyeliner, she's flirtatious, erotically suggestive, but nonthreateningly so. Even at 33, there's something girlish about her, a characterization that some women might consider an insult, though it's really a gift, suggesting not innocence or helplessness but a capacity for delight. It's the kind of thing you want to hang onto until you're 100 or beyond. Watching Swift made me wonder what kind of a performer she'll be at 50, 60, 70. It seems there are still many unexplored rooms in her mansion.

At a run time of nearly three hours, *The Eras Tour* is enough Taylor Swift in one sitting for just about anyone. Yet by the end of this rather long sojourn, Swift looks as if she's just getting started. Her hair may have frizzed slightly, but that's about it. No matter how much money she stands to make off this enterprise, there's no sense that she's kept the meter running. She'd give even more, if we wanted it.

The era of women having the means to make enough money to take care of themselves is relatively recent. Just ask Edith Wharton's Lily Bart. My *Eras Tour* ticket cost less than \$20, and I begrudge not a cent of it. Swift doesn't need more money, but I had much more than \$20 worth of fun. And got a bracelet to boot. □

POP CULTURE

Move over, Halloween: 2023 is one long costume party

HANGING IN KHLOÉ LEWIS' closet is a shimmering lavender party dress with a single puffed sleeve, a bedazzled minidress with matching cowboy hat, and a rose-colored shirt. She wore these items to Taylor Swift's Eras Tour, Beyoncé's Renaissance World Tour, and the *Barbie* movie, respectively. For Lewis, a 29-year-old PR professional, dressing up made the experience even better. "It's always fun to have a reason to dress up in something that's outside of your norm," she tells TIME.

Lewis isn't alone. This summer, concert- and moviegoers showed up in themed regalia. For *Barbie*, attendees donned all shades of pink, from a shocking magenta to more demure hues of bubblegum. At the Eras Tour, Swifties paid homage with sparkles, bright colors, and friendship bracelets. Meanwhile, fans wore disco-inspired clubwear in silver and black, accessorizing with rhinestone-encrusted cowboy hats and boots, to Beyoncé's

Club Renaissance. And with Swift and Beyoncé both dropping concert movies, it appears that the costume party that was 2023 shows no sign of stopping.

The popularity of theme dressing this year shouldn't come as a surprise; after a few taxing years, wearing something bold, daring, or just a little silly can hold untold thrills. Nicole Otto, a 32-year-old creative executive and self-described "super Swiftie," said she was determined to dress up because of the lack of opportunities to do so in recent years. "It's the same thrill you get on Halloween, being playful and having fun," she says.

But for fans like Jezz Chung, a 32-year-old artist, dressing up for the Renaissance tour and the *Barbie* movie was empowering too: "Dressing up feels like a way to maintain a sort of agency of our bodies and our lives, shaping who we are in this world and how we get to show up." —CADY LANG



Fans found creative and colorful ways to express themselves

Sly Stone The American music icon on his new memoir, reclaiming his past from myth at 80, and forgiving himself

How are you feeling these days?

I feel good in my mind, but my health is not very good. I have COPD, which reduces my lung capacity, and other problems too. For part of this year I couldn't hear almost at all until I got a hearing aid.

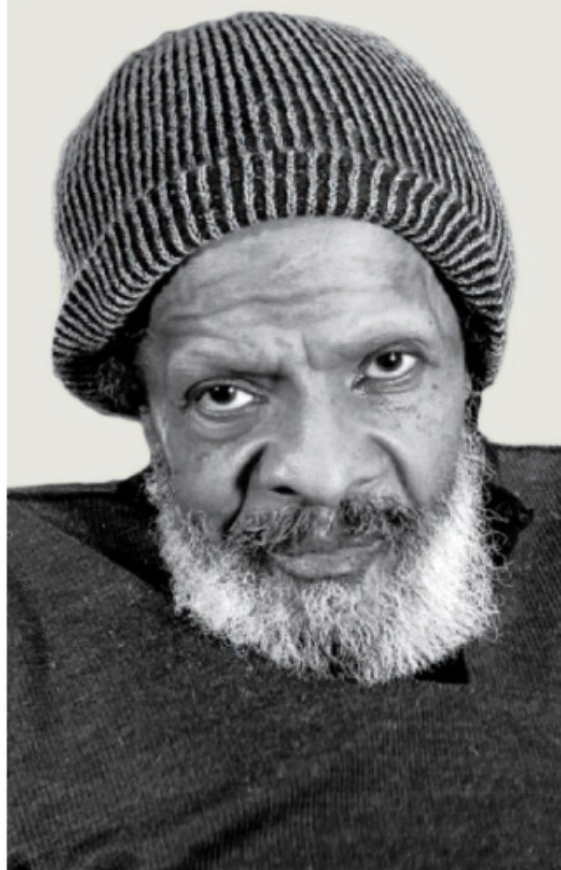
In your memoir *Thank You (Falettinme Be Mice Elf Agin)*, you write that you had to enter “a new frame of mind to become Sylvester Stewart again to tell the true story of Sly Stone,” referring to your birth name. What was that like? People liked to say there were two personalities in me. A doctor said it when I was in rehab, that Sylvester was welcome in meetings but Sly couldn't come. My dad even said there were Sly days and Sylvester days. I never thought that's how it was. I was the same person no matter what. But there was a myth, some stories that people liked to tell. I had to get past some of the Sly Stone stories, and the only way to get past them was to go right through them.

In your memoir, you write that “Music could keep you out of the fire.” Has your conviction about the power of music changed over the years? I know music can always make a difference. I knew it when I was [a DJ] on the radio. People would call into the station and say that they wanted me to play this song or that, and I could tell how much it meant to them. It's good for good ideas and good feelings to stay alive.

Was it painful for you to revisit difficult times, including drug addiction and familial strife? There were lots of things I felt, but I wouldn't say that one of them was pain, exactly. Remembering wasn't always easy. Sometimes things came back, and other times I needed to hear the story of what other people thought

When you think back on your life, does it come back in memories? In melodies? In feelings?

It's all of them. There are pictures and sounds. There are feelings and feelings about those feelings. There are stories I remember and stories I have heard about myself. Some of the stories people told about me were right on and others were right off.



happened so I could go back in my memory and get a clearer idea. The more I went, the main thing I felt was that I wanted to forgive other people and also to forgive myself.

You wrote about a time when the laughter of the audience on a talk show got under your skin. Did you have many experiences like that? When I watch it now I remember that it was for entertainment, but there was also something at stake. Audiences weren't always right there with us. There were concerts where I would try to talk to the crowd and they wanted a different kind of party. That happened at Coachella. There were talk shows where I wasn't making jokes and people laughed. That happened on David Letterman.

Sly and the Family Stone's 1971 album *There's a Riot Goin' On* is widely regarded as one of the best albums ever. Do you yourself look back on it as a high point in your life or career? It's hard to say a thing like that about one album or another because I was there when they were happening. I like that album, but I also like *Fresh* and I like *Stand!* and I like the first album we ever made. High points are for other people to think about.

Your memoir has a section on George Floyd. How would you compare the 2020 summer of protest to earlier ones you've witnessed? I still watch the news and still think about what could make things better in America. There are days when it feels like things are going in the wrong direction, that every good thing has two bad things behind it. Black and white, rich and poor, we have to find some way to live together without hurting each other. It's not simple but it's important. —ANDREW R. CHOW



THE
HONEY-LICIOUS,
DAYTIME,
COUGHING,
ACHING,
STUFFY HEAD,
FEVER,
SORE THROAT,
CONGESTED CHEST,
POWER
THROUGH
YOUR DAY,
MEDICINE.

READ EACH LABEL. USE AS DIRECTED.
KEEP OUT OF REACH OF CHILDREN.

THIS HOLIDAY SEASON
THE RACE NEVER STOPS

